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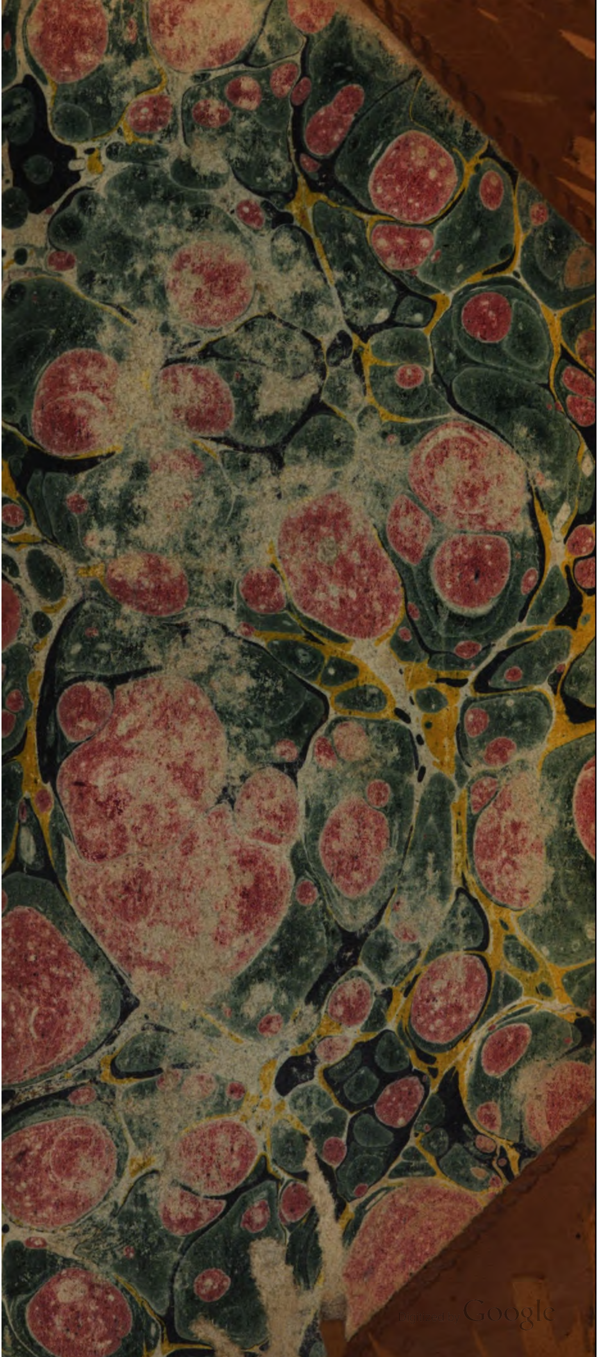

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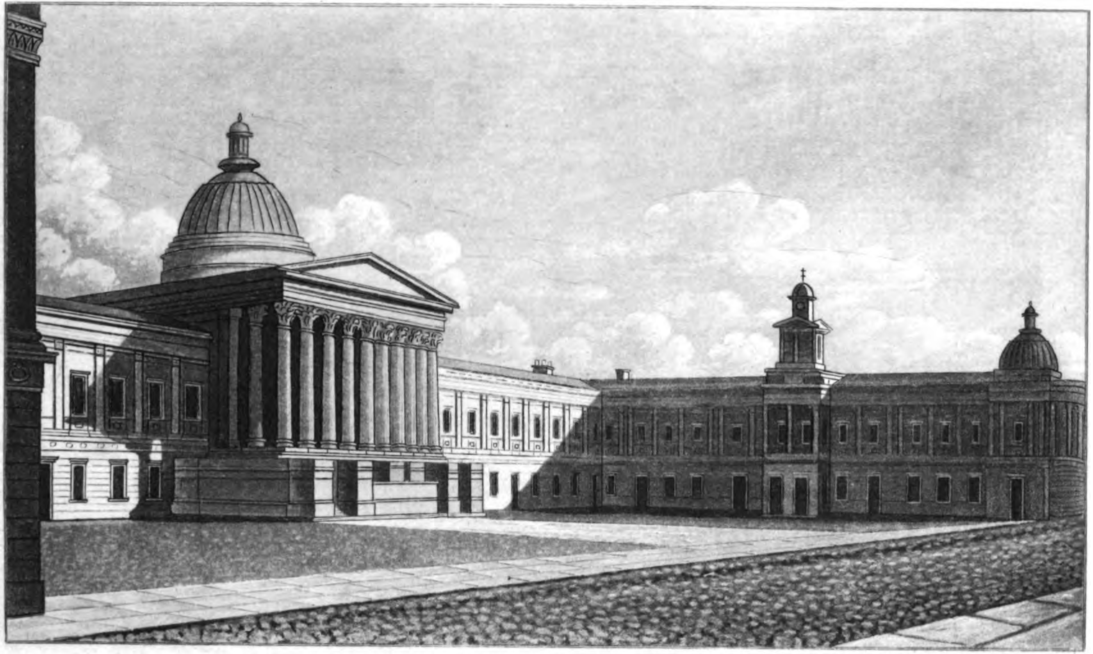

THE UNIVERSITY OF LONDON

J.1829

ARCANA OF SCIENCE,

AND

ANNUAL REGISTER

OF

THE USEFUL ARTS.

ABRIDGED FROM

THE TRANSACTIONS OF PUBLIC SOCIETIES,

AND FROM

THE SCIENTIFIC JOURNALS, BRITISH AND FOREIGN,

OF THE PAST YEAR.

BIBLIOTHECA

Illustrated with Thirty-two Engravings.

The most important principle perhaps in life is to have a pursuit—a useful one if possible, and at all events an innocent one.—*Sir H. Davy.*

LONDON:
PRINTED FOR JOHN LIMBIRD, 143, STRAND.

1829.

P. R.

ADVERTISEMENT.

The successful sale of two Editions of the *Arcana of Science and Art* for 1828, has encouraged the production of the present volume; and stimulated the Editor in his exertions to render it still more worthy of public patronage than its predecessor.

The plan, or arrangement, of the following pages, corresponds with that of the volume for 1828; the respective divisions, of course, being proportioned to their intrinsic interest. The departments of Mechanical Invention, and Chemical Discovery, and New Facts and Phenomena in Natural History, occupy a large portion; but their interest will, it is hoped, be found commensurate with the extent. The numerical contents of the principal divisions may be estimated by the following recapitulation:—

	Articles.
Mechanical Inventions - - -	100
Chemical - - - - -	70
Natural History - - - -	135
Phenomena of the Weather - -	35
Rural Economy - - - -	100
Useful Arts - - - -	50
Domestic Economy - - - -	50

In the present volume will be found Abstracts of the Transactions of the Public Societies for the advancement of Science and the Useful Arts—as the Royal Society, the Royal Institution, and the Society of Arts; and a popular description of the newly-formed establishments—the National Repository, and the Gardens of the Zoological Society in the Regent's Park. In addition to these, are all the most important records of private as well as public ingenuity and enterprise.

In the departments of Chemical Science, and Zoological Discovery, the illustrious names of DAVY, HUMBOLDT, and CUVIER, will be recognised with much pleasure; attached to lucid and popular illustrations of some of the most interesting Phenomena in the whole range of Nature's world.

To the sources or authorities, severally quoted throughout the work, the Editor returns his best acknowledgements; especially to the "Magazine of Natural History," a work of high character and promise, which has been successfully established within the past year.

The contents of the present volume exceed that of last year, by two sheets, or 48 pages; and the number of Engravings will be found nearly double. Notwithstanding this important increase, (which was requisite for the completeness of the work)—an advance of sixpence only has been made on the original price.

In conclusion, the Editor thanks the public for their very extensive patronage of his first volume, and hopes that the present may be found alike worthy of their good opinion. As an enthusiastic lover of Nature, and an ardent admirer of Art, he has many associates; but in anxiety for the encouragement of popular philosophical studies, he yields to none, however he may be eclipsed in the sphere of exertion.

THE EDITOR OF THE MIRROR.

143, *Strand, January* 30*th*, 1829.

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THE

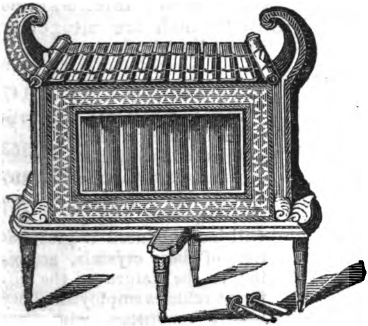
ARCANA OF SCIENCE,

&c.

Mechanical Inventions, &c.

CURIOUS JAVANESE MUSICAL INSTRUMENT.

MR. C. WHEATSTONE, the ingenious inventor of the Kaleidophone, or Phonic Kaleidoscope,* has lately been engaged in a series of interesting experiments on Resonance, or the Reciprocation of Sound. These were communicated to the Royal Institution, on February 15, in a Lecture delivered by Mr. Faraday, and illustrated by many curious instruments of music from Java, one of which is represented in the engraving.



Among the Javanese musical instruments brought to England by the late Sir Stamford Raffles, there is one called the Génder, in which the resonances of unisonant columns of air are employed to augment, or almost to render audible, the sounds of vibrating metallic plates. Of these plates there are eleven; their sounds correspond with the notes of the diatonic scale, deprived of its fourth and seventh, and extend through two octaves. The mode of vibration of the plates is that with two transversal nodal lines; and they are suspended horizontally by two strings, one passed through two holes in the one nodal line, and the other through similar holes in the other nodal line of each plate. Under each plate is placed an upright bamboo, containing a column of air, of the proper length to reciprocate the lowest sound of the plate. If the aperture of the bamboo be covered with pasteboard, and its corresponding plate be struck, a number of acute sounds only (depending on the more numerous subdivisions of the plate) will be heard; but on removing the pasteboard, an additional deep, rich tone is produced by the resonance of the column of air within the tube.

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* See "Arcana of Science, &c. for 1828," page 42.

The instrument from which the annexed drawing was taken is at present in the museum of the Honourable East India Company; and there is another specimen in the possession of Lady Raffles.

The same principle appears to have been employed, in more rude forms, in the construction of several Asiatic and African musical instruments; but we are not aware of any instrument having yet been manufactured in Europe, in which the unisonant resonances of columns of air have been made available as a means of augmenting the intensity of sounds.*

MICROSCOPIC NOVELTIES.

During the past year, a series of interesting microscopic examinations have been conducted by Mr. Thomas Carpenter, the optician of Regent-street. The result of these examinations has been published, progressively, in Mr. Gill's *Technological Repository*, to which work we are indebted for the following popular illustrations of this attractive branch of recreative science. It should, however, be mentioned, that Mr. Carpenter has been materially assisted by Mr. Gill; and by their united talents, these gentlemen have produced several results which are altogether new to the collectors of microscopic curiosities.

Crystals of Salts.

Fig. 1.

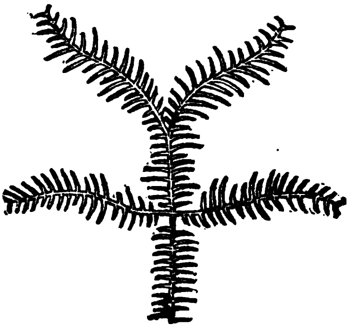

Fig. 1. represents a beautiful configuration formed in the solution of the muriate of soda, or common salt, in viscid mediums, which prevent it from shooting into crystals. Mr. Gill has produced a great variety of these crystals, according to the nature of the different vehicles employed. They mostly commence with lines crossing each other, and either at right angles, or at acute and obtuse ones, from which ramification they extend themselves around; sometimes these lines are straight, and others curved. Thus, in *fig.* 1. a straight line is seen crossed by a curved serpentining one, and expanding at one end into two other curved ones.

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* Brande's Journal.

Fig. 2.

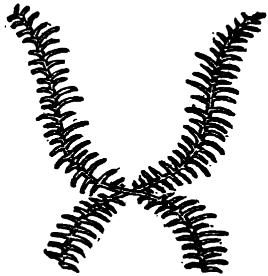


Fig. 2. is another modification, consisting of two curved lines crossing each other. Others assume beautiful branching forms, without the crystals shooting from the lines, of the singular elegance of which, an engraving would convey but a very imperfect idea.

Eggs of the Hemerobius Parla.

This singular and beautiful insect not only affixes or agglutinates its eggs to the edges of leaves, by threads discharged from the abdomen; but it likewise erects its eggs upon slender stems, distributed over the surface of such leaves as the aphis had previously laid its eggs upon, and as shown in *fig.* 3. The eggs are thus kept out of the reach of the young aphides, which otherwise would destroy them, by means of the piercers attached to their rostrums, before they are hatched, and have attained their larva state. The young aphides, immediately on their exclusion from the eggs, commence feeding upon the juices of the leaf, by the assistance of the tubes and piercers contained within the proboscis with which each is furnished; and, under the microscope, they present the appearance of a flock of sheep feeding upon an extensive plain. Whilst the aphides are thus luxuriating, the larvæ of the hemerobius are excluded from their eggs, and immediately crawl down the slender props upon which they rested, and commence devouring the aphides. In this larva state, these insects are termed Plant Louse Lions, in consequence of their feeding so voraciously upon the aphides; and by thus thinning them, they are doubtless of great service in the general economy of nature. The hemerobius, when viewed under a microscope, is one of the most splendid objects in nature, and has long been celebrated among microscopic wonders.

Fig. 3.

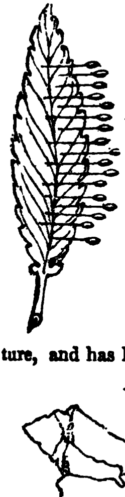
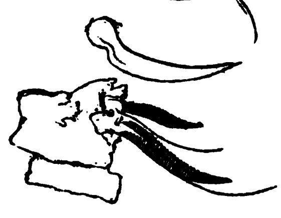


Fig. 4.



Jaws of the Mite.

Fig. 4. is a magnified representation of the *Jaws and Teeth of the Cheese Mite.* These two sets were separated and prepared for the microscope by Mr. T. Carpenter. It will be seen that two of the jaws are larger than the other two. There is also an appendage joined to each pair of jaws, somewhat resembling a finger in shape, one of which is dislocated from its union with the jaws, and is represented closely adjoining to it. In others of the mites which Mr. Carpenter has attempted to separate, he has found two other appendages to their mouths, resembling the small claws of a crab or lobster. The curved jaws would indicate that the action of the two sets of teeth was similar to that of scissors or shears, cutting sideways, somewhat like the action of a cow chewing the cud, and not up and down, as in the usual manner of chewing.

The Conferva Reticulata.

Fig. 5.

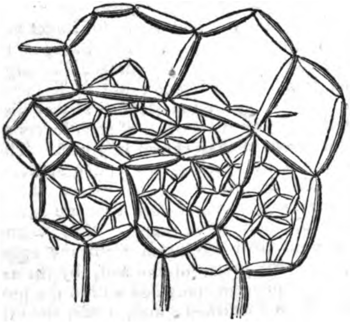


Fig. 5. represents a specimen of the *Conferva Reticulata*, an exceedingly rare and beautiful *water moss* found in a ditch at Lee, near Lewisham, Kent. On its being placed in water, in a watch-glass under the microscope, it expanded and exhibited the very curious structure shown in the figure. It is of a green colour, and forms cylindrical masses, in its natural state; but here only a few ramifications are shown. The net-like meshes are varied, consisting of from four to seven sides; and they are of several different sizes, according to the age of the conferva; some are large enough to be distinguished by the naked eye, whilst others require the aid of powerful magnifiers to discern them. This *Conferva*, or Moss, is the resort of numerous species of animalcules; and, consequently, is highly useful in affording a great variety of specimens for examination under the microscope.

PATENT METALLIC CAISSONS.

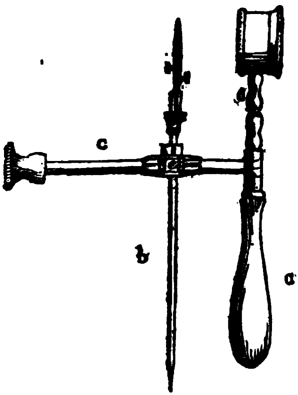
A PATENT has recently been obtained by a Mr. Deeble, for the construction of piers, harbours, break-waters, docks, aqueducts, foundations, embankments, mill-dams, rivers, &c. with "metallic caissons."

The invention is fully described in a volume written by the patentee, and lately published. The caisson is a hollow metallic box, open generally both at the top and bottom; the thickness of its sides is proportioned to the strength and gravity required; and the caissons are united together by dovetails. In works of considerable extent, it is recommended that the caissons be 7 feet long, 5 feet deep, and from 2 to 5 feet wide,—the width being regulated by the solidity required. In raising one tier of caissons above another, each tier is united to those immediately below and above it, by commencing the alternate vertical courses with a half caisson. The caissons intended for foundations are closed at the bottom. In common dock or canal banking, the thickness of the front and back of the caissons need not exceed 1 inch; half that thickness is sufficient for the sides; in works exposed to a heavy sea, caissons of greater thickness may be adopted. The interior of the caissons, after they are erected, is to be filled with liquid lime and rubble, wet sand, or other suitable material to be found on the spot, so as to form a solid mass, girt with metal.

The patentee states that various calculations of the comparative expense of granite and cast-iron caisson work, show an advantage in favour of the caissons of from 20 to 50 per cent. and upwards; and that walls constructed of caissons can be erected in one-fifth of the time required to build them with stone. The latter circumstance is obviously of very great importance in reference to works on the coast.

A collection of models illustrative of Mr. Deeble's invention, may be inspected at Messrs. Buckland and Smith's, 3, Furnival's Inn.*

PORTABLE MICROSCOPE.



This simple, cheap, and useful instrument, invented by the late Mr. Barber, optician, is represented in the engraving. It consists of a handle of hard wood *a*, which is screwed into a brass piece *d*, and which has at its top, a ring, with female screws on back and front, into which are to be screwed two cells, with lenses of different foci burnished into them. There is also a projecting part formed on the side of the brass piece *d*, in which is a screwed hole to receive the screwed end of a cylindrical rod of brass *c*, which has a shoulder adjoining to its screw to steady it, when screwed home. There is also at the other end of the rod *c*, a milled head to turn it by. Upon the rod *c* a springing split socket *e* slides backwards and forwards, and is also capable of being turned round upon the rod in all directions. This socket has affixed to it, on one side, a projecting part, which has a screwed cavity in it, which receives a short screwed tube, having a small hole in its centre, made to fit the steel, cylindrical stem of the spring forceps; and a corresponding hole being also made at the bottom of the screwed cavity, above mentioned, a bit of perforated cork is lodged in that said cavity, which being pressed upon by the action of the screw, closes upon the steel stem of the forceps, and acts as a spring serving to steady the forceps, and the objects held in them, in any required situation. The short screwed tube has a slit sawn across its top to receive a turnscrew, by which it can be turned more or less, as required. The stem of the forceps being removed from its place in the short tube; the handles and lenses; and the rod *c*, and the sliding socket upon it, unscrewed from its place in the handle; can all three be then packed in a black paper case with a pull-off top, and which case is only 3½ inches long, 1 inch broad, and half an inch thick, so as to be exceedingly portable. This miscroscope, observes Mr. Gill, possesses three different magnifying powers; viz. those of two lenses separately, and the two in combination; and has every facility for the adjustment of the objects; and its great utility and cheapness ought therefore to render it an article of frequent sale.*

---

* Mech. Mag.

This ingenious but simple instrument, appears peculiarly adapted for the amusement of young persons, and is well calculated to aid them in the delightful study of Nature.

THE LARGEST STEAM ENGINE.

THE most powerful steam engine in England, is that erected by Mr. Watt, at Hawkesbury Colliery, near Coventry. Its cylinder is 58 inches in diameter; the piston moves 8 feet in a stroke, and makes 12 strokes in a minute; the pump is 14 inches in diameter, and the lift is 65 fathoms.†

CHIMNEY OF THE EAST LONDON WATER-WORKS.

(See Engraving.)

THIS is a correct representation of a chimney which has just been completed for the East London Water-Works, at Old Ford, near Bow. It is a handsome column, 175 feet high, and is remarkable for having been executed entirely from within, without the aid of any external scaffolding. We are not aware of any thing of the kind having been before attempted.‡ Both the workmen and materials were raised by means of horse power; and the outlay for scaffolding, which in such erections forms always so material an item, did not, we are informed, exceed 10*l*. The designer, as well as builder, is a Mr. C. H. Capper, of Birmingham.§

* Technological Repository.

† Farey's Treatise on the Steam Engine.

‡ It is remarkable, that the traditions of all the people in the neighbourhood of the *round towers* in Ireland, agree in stating that they were built in the same manner.—*Mirror*, No. 335. The *Scotsman* newspaper observes, that Mr. Inglis, a builder in Edingburgh, built the high chimneys of the Coal Gas Works, in that city, without scaffolding, seven or eight years ago; and is now employed in raising a lofty spire on the Tron Church, for which no scaffolding has been yet used, although it has reached the height of 150 feet. Mr. Inglis, it is said, employs a sort of wooden crane for lifting up his materials, which is worked from below by ropes passing through a tube.

§ Mech. Mag.

THE GUIMBARDE, OR JEW'S HARP.

This simple instrument consists of an elastic steel tongue, riveted at one end to a frame of brass or iron; the free extremity of the tongue is bent outwards to a right angle, so as to allow the finger easily to strike it when the instrument is placed to the mouth, and firmly supported by the pressure of the parallel extremities of the frame against the teeth.

The vibrations of the tongue itself correspond with a very low sound; but being placed before the cavity of the mouth, the form and dimensions of which are capable of various alterations by the motions of the tongue and the lips, when the number of vibrations of the contained volume of air is any multiple of the original vibrations of the tongue, a sound is produced, corresponding to the modification of the oral cavity.

Supposing the primitive sound of the tongue to be C^1, the series of sounds which it can produce by multiple reciprocation will be as follows:—

Multiples of the original vibrations of the tongue.

$\dot{1}\ldots\dot{2}\ldots 3\ldots\dot{4}\ldots 5\ldots 6\ldots 7\ldots\dot{8}\ldots 9\ldots 10\ldots 11\ldots 12\ldots 13\ldots 14\ldots 15\ldots\dot{16}$ etc. $\dot{32}$

Corresponding Sounds.

C^1 C^2 G C^3 E G B♭ C^4 D E F+ G A− B♭ B C^5 etc. C^6.

If the original sound be any other note, another series will arise, but the intervals of the successive sounds will always preserve the above relations. By the usual Jew's Harps the three first sounds of the series cannot be produced, the dimensions of the cavity of the mouth not being sufficiently large to reciprocate them.

The scale above exhibited is evidently too incomplete and too defective, to allow even the most simple melodies to be performed on a single Jew's Harp; but the deficiencies may be supplied by employing two or more of these instruments. Mr. Eülenstein, by availing himself of the resources afforded him by the scales of sixteen Jew's Harps, is able to modulate through every key, and to produce effects truly original, and of extreme beauty. Those who have heard only the rude twanging to which the performance of this instrument in ordinary hands is confined, can have no idea of the melodious sounds which, under Mr. Eülenstein's management, it is capable of producing.

The following experiment will prove the accuracy of the preceding explanation, and will establish the true theory of the production of sounds by the Guimbarde, beyond the possibility of doubt.

I fixed a Jew's Harp firmly at the two points where ordinarily it rests against the teeth, allowing sufficient space between the two supports for the tongue to vibrate freely to its greatest extent; and I tuned the tongue by applying wax to its free extremity, until it sounded C, corresponding to the sound of a closed tube four feet in length. I then placed before the tongue the open end of a closed tube, containing a column of air two feet in length and one inch in diameter, and furnished with a movable piston, by which the column could be shortened to any required length. On striking the tongue, the octave of the fundamental sound was produced, being the sound 2 of the scale in the preceding section; by shortening the column of air successively to one third, one fourth, one fifth, one sixth, one seventh, &c, &c. up to very numerous aliquot subdivisions, all the notes of the series were correctly obtained. By marking the different lengths of the piston rod for each sound of the series, I was able to produce the notes of the scale, ascending or descending regularly, or to fix any sound at pleasure.*

FRENCH FILTER.

(See Engraving.)

IN the engraving, A, B, C, D, are two concentric conical vessels formed of wood; the outer one of them A B stands upon its bottom as usual: and the other, or inner one C D, is secured in its place upon the bottom of A B by dowels and a border around it; a row of holes also being made through and around the inner vessel C D, just above its bottom. Sand, and sand mixed with charcoal powder, is placed within both vessels, as indicated in the figure, and in successive layers. The wooden cover E F which is pierced full of holes, receives the water to be filtered, and which falls into the inner vessel, and thus prevents the falling water from disturbing the arrangement of the first layer of sand placed within it.

On this inner vessel being kept constantly filled with water to the proper height, it descends through the different layers in the inner vessel, passes through the holes in the lower end of it, and again ascends to the cock fixed in the outer vessel, through the layers of sand placed in that vessel.

In order to preserve this filter in use, without unmounting it, we must proceed in the following manner:—

After having taken out the cover pierced with holes, from the inner vessel, we fill with pure water, the space between the two vessels, and replace the water continually, as it passes into the inner vessel, in order to procure as great a pressure as may be; this new current, established in a contrary direction to the original one, frees the filter from all its obstructions. We must, however, wash well and agitate the uppermost layer of coarse sand, during the time, by employing a wooden bowl or dish to stir it up with; and remove the muddy water as often as it becomes discoloured; the filter will thus again become as perfect as at first. It is better, however, before proceeding to stir up this upper layer of sand, to throw a little water into the inner vessel,

* Mr. Eülenstein, in Brande's Journal.

to wash the mud from its surface. The water used for these washings may be deposited in tubs, and left to settle; it may then be poured off, and passed through the filter for use.

It is necessary, that this cleansing process be performed once a week; lest the foreign matters, brought in with the water to be filtered, should agglutinate around the grains of sand, and clog them up in time, so completely, as to form a hard crust, which the opposite current of water could not force through without derangement thereof; and in fact would require the whole system to be unmounted, washed, and the materials constituting the filter to be replaced. This filter is universally adopted in the French navy, with great success.*

BRUNSWICK THEATRE.

Among the "Public Improvements" in our volume for 1828, will be found an outline of this splendid fabric, which rose and fell like a work of enchantment. The investigation of the cause of the catastrophe excited considerable interest, especially among scientific men, and much practical information was elicited during its progress.

This inquiry occupied several days, so that a report of the proceedings would nearly occupy the whole of this volume. It commenced on the 5th of March. On the 9th of April, Messrs. Nash and Smirke, the architects, were sworn, and gave the following as their opinion on the cause of the accident:—

"After a careful inspection of the ruins of the Brunswick Theatre, and of the drawings of its construction exhibited to us, and having read the various depositions made concerning it, we are of opinion, that the principle upon which the roof was constructed was injudicious, unsafe, and improper for a theatre; that the walls were not in a condition to support the weight that such a building must necessarily charge upon them; and that the manner in which the flooring of the several circles of boxes and of the gallery was supported, as it is still seen in part of the building that remains, was very weak and improperly executed. It is, however, impossible for us to point out which of these causes led to the immediate destruction of the Theatre; but from the account given by several of the deponents, describing the use that was made of the roof, and the change that was observed in the form of different parts of it several days before the fall took place, we are of opinion that the roof gave way, and, by its fall, destroyed the weaker parts of the building."

In answer to other questions, Messrs. Nash and Smirke said, that the mortar was not judiciously used, and did not adhere to one-third of the bricks; therefore the roof was not calculated to have any weight suspended to it; that having regard to the number and size of the openings, they thought the building insufficient to support the roof; that the roof was improperly constructed, inasmuch as the principles were all parallel, and if one of them gave way, the whole would fall like a pack of cards; and that the walls were not of sufficient thickness. Mr. Nash said, he knew that

* Technological Repository.

the roof was a most dangerous one; and if no other cause existed, he was of opinion that the weight improperly appended to the roof was a sufficient cause to account for the accident.

Mr. Hill, who represented Mr. Whitwell, the architect of the Theatre, said, that the opinions of many scientific gentlemen differed materially from those of Messrs. Smirke and Nash, and he proposed that they might be examined on a future day.

The Jury said, they were satisfied with the evidence already given, and the Coroner proceeded to read the whole of the statements of the witnesses prior to giving his charge, after which the Court adjourned till the following day.

On the 10th of April, the Coroner charged the Jury at great length, and on the next day the Jury returned the following SPECIAL VERDICT:—

"The Jurors charged to inquire touching the cause of the deaths of the deceased persons (whose names were set forth,) unanimously return the following special verdict:—

"*First*—Accidental Death as to the above-named parties, caused by the fall of the iron roof, with the matters and things attached thereunto, and therefrom pendant, and a part of the front wall and balcony of the messuage in Wells-street, known as the late Royal Brunswick Theatre. They further find, that the said lamentable accident was caused by the hanging of heavy weights improperly to the iron roof.

"*Secondly*—That the weights so improperly hung, were so placed by the orders of the Proprietors. They further find, that many warnings had been given to the Proprietors. They further find, that sufficient indications of failure appeared, of which Mr. Carruthers was cognizant, which ought to have been sufficient to have induced a prudent man to have closed the Theatre, until the danger apparent from such indications had been provided against. The Jury return, as a deodand, the substances which moved to and caused the death of the aforesaid persons, viz.—the iron roof and gutters, slates, hips, and fastenings, and, in fact, all the usual parts of the roof; also the carpenters' and painters' shops, the flies, the girders which supported the shops, one of the proscenium posts, part of the balcony, and cantilevers; also that part of the front wall described by the witness, Finlay, to have fallen. They do not find the geometrical staircase to have moved to the death of the deceased persons, nor do they know the value of the said substances."*

THAMES TUNNEL.

In our volume for 1828, we noticed the progress of this grand work, up to the meeting of the Directors, immediately after the second irruption, January 12. Soon after this meeting, an Act of Parliament was obtained for raising by way of loan, the money required for its completion. The money to be borrowed under this act is limited to £200,000.; but it is estimated that no more than half this sum will be wanted, as was stated at a special meeting of the proprietors, held May 11, 1828. At this meeting the following resolutions were passed:—

"1. That the Tunnel having been completed to the extent of 600 feet from the shaft at Rotherhithe, and there remaining only 350 feet to arrive at low water mark, near Wapping, this Meeting receives with satisfaction and confidence the expressed opinion of Mr. Brunel, the engineer of the Company, that the Tunnel may be completed; considering, as this Meeting does, that in the space of 200 feet, which have been already excavated within low water mark, under the directions of Mr. Brunel, the water has only broken in three* times; that rivers, notoriously, never make irruptions at high water; that independently of the great reliance which Mr. Brunel's past success justifies the Meeting in reposing on any opinion of his, the one he has now expressed is no more than what everybody else entertains; namely, that the Tunnel 'may be completed;' and that to have inquired of other competent engineers, whether it is likely that it will be completed, with the means now provided for the purpose, would, after such assurance, and under such circumstances, have been equally impertinent and useless.

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* Mech. Mag.

"2. That the Directors be authorized to raise, under the authority of the Act of Parliament recently passed, such sums of money as they may deem necessary for the completion of the undertaking, not exceeding £200,000. with power to make such allowances as they may consider reasonable to those who may assist in raising the money; the Meeting having reason to think, that after the very decided and satisfactory opinion expressed by their engineer, Mr. Brunel, that the Tunnel may be completed, capitalists must now be so eager to invest money for the purpose, that not more than a bonus of fifty per cent. will be necessary to induce Jew Brokers and others to embark with heart and soul in the speculation.

"3. That when a sum of £100,000. shall have been agreed to be subscribed, the Directors do proceed with the works, and commence making their call on subscribers; this Meeting being of opinion, that when that sum shall have been secured, every financial obstacle in regard to the completion of the Tunnel will have been overcome; it having been satisfactorily shown to the Meeting, that though upwards of £200,000. have been expended in excavating the Tunnel to the extent of 600 feet, that furnishes no reason whatever for suspecting that there can be any error in estimating that the remaining 700 feet can be executed for half the sum.

"4. That the account of the tolls of the Tunnel, estimated on the principle of their exceeding the tolls taken annually on the Waterloo Bridge (which in the last year amounted to £13,688.,) will, in the opinion of this Meeting, be more than sufficient to pay interest on the money to be raised, and leave, with the revenue from the freehold property and other effects of the Company which will not be required for the purposes of the Tunnel, an income for the proprietors in respect of the capital invested; it being clear to the Meeting that income is income, however small, and that ever so little is better than none at all."

The subscription to the loan proceeded but slowly, and on Saturday, July 5, a public meeting was convened for raising the required sum by voluntary subscription. At this meeting were present the Dukes of Cambridge, Wellington, and Somerset, the Earls of Aberdeen, Powis, &c. when resolutions were entered into, strongly declaratory of the national importance of the undertaking, and upwards of £5,000. subscribed.

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* There was a *third* irruption, but too trifling for notice.

MANUFACTURE OF MARBLES IN GERMANY.

These well-known articles are made in great quantities to serve in the games of children; some are formed of potter's clay, covered with a glaze, and burnt in a proper furnace; others are made of marble and alabaster, but chiefly of a species of very hard calcareous stone, found in the neighbourhood of Cobourg, in Saxony. These stones are first broken into square blocks by means of a hammer, and are finally rounded into spheres or small balls by a mill. In order to this they are placed from one hundred to a hundred and fifty at a time, upon a fixed slab of stone, having a number of concentric circular grooves or furrows made in its flat surface. Above this stone another flat slab or block of oak, of the same diameter, is supported by means of a lever, and turned round by the power of the mill. During the rotary action of this mill, small threads of water are made to enter each of the concentric grooves, which favour the rounding and polishing of the balls, and prevent the wood from heating. The operation for each of the quantities above mentioned lasts for a quarter of an hour, and the balls or marbles become perfectly spherical and fit for sale. Immense quantities of them are exported to India and China. A mill with three turning-blocks will manufacture 60,000 marbles a week.*

IMPROVED BOOKBINDERS' PRESS.

Mr. Burn has lately introduced an improved method of rendering the books extremely compact and solid, by passing the sheets, when folded, between a pair of powerful rollers, and in some cases inserted in plates of tinned iron or other metal, which method will entirely supersede the old laborious and imperfect one of beating with the hammer, the blows of which, suddenly compressing the air between the leaves, creates a heat which is liable to make the printing *set off*, as it is termed, on the opposite pages.

The press consists of two iron cylinders about a foot in diameter, adjustable in the usual way by means of a screw, and put in motion by the power of one man, or of two, if more convenient, applied to one or two cranked handles. In front of the press sits a boy, who gathers the sheets into packets, by placing two, three, or four upon a piece of tin plate, of the same size, and covering them with another piece of tin plate, and thus proceeding by alternating tin plates and bundles of sheets till a sufficient quantity have been put together, which will depend on the stiffness and thickness of the paper. The packet is then passed between the rollers, and is received by the man who turns the winch, and who has time to lay the sheets on one side, and to hand over the tin plates by the time that the boy has prepared a second packet. Among other books that were pressed in presence of the committee* was a minion Bible, which was passed through the press in one minute, whereas the time necessary to beat the same would have been twenty minutes. It is not, however, merely a saving of time that is gained by the use of the rolling-press; the paper is made smoother than it would have been by beating, and the compression is so much greater, that a rolled book will be reduced to about five-sixths of the thickness of the same book if beaten. A shelf, therefore, that will hold fifty books beaten in the usual manner would hold nearly sixty of such if rolled in Mr. Burn's manner,—a circumstance of no small importance, when it is considered how large a space even a moderate library occupies, and the bookcases are an expensive article of furniture.

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* From the French.

SELF-STEERING SHIP.

It is possible to make a ship or boat steer itself, by having a powerful vane on the mast-head, connected with the tiller-ropes by two projecting arms from its axis. If desired to make the ship sail directly before the wind, the tiller-ropes would be fixed to the vane, so that the helm should be in the middle position, when the vane were pointing directly forward; and should the vessel then from any cause deviate from her course, the vane, by its changed position with respect to her, would have produced a corresponding change on the position of the helm, just such as to bring her back to her course. It is evident that, by adjusting such a vane and rudder to each other in different ways, any desired course might be obtained, and which would alter only with the wind. The vane would require to be of large size to have the necessary power; a wide hoop, for instance, with canvass stretched upon it; and the rudder, that it might turn with little force, would be hung on an axis through its middle, instead of, as usual, by hinges at one edge. Cases have occurred where ship-wrecked persons might have sent intelligence of their disaster to a distant coast, by a small vessel, or even a block of wood fitted up in this way; and the method might sometimes save an additional hand in a boat's crew. It admits also of other applications, particularly in war.†

COMPOUND METALS.

Standard of British Gold Coin.—This standard by law is, for every pound weight to contain eleven-twelfths of pure gold and one-twelfth of alloy.

Standard Silver.—11 ounces 2 pennyweights of fine silver and 18 pennyweights of alloy in a pound troy.

Gold Solder.—Pure gold 12 pennyweights; pure silver 2 pennyweights; and copper 4 pennyweights.

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* Trans. Soc. Arts.

† Arnott's Physics.

Silver Solder for Jewellers.—19 pennyweights of fine silver; copper 1 pennyweight; and of brass 10 pennyweights.

Silver Solder for Plating with.—10 pennyweights of brass and 1 ounce of pure silver.

Ring Gold.—Fine copper 6 pennyweights and 12 grains, 3 pennyweights and 16 grains of fine silver, to 1 ounce 5 pennyweights of gold coin. This is worth about 3*l.* per ounce.

Gold from 35*s. to* 40*s. per ounce.*—8 ounces 8 pennyweights of fine copper, 10 pennyweights of fine silver, to 1 ounce of gold coin.

Manheim Gold, or Similor,—3½ ounces of copper, 1½ ounce of brass, and 15 grains of pure tin.

Pinchbeck.—1 ounce of brass, 1½ ounce or 2 ounces of copper, fused together under a coat of charcoal dust.

Prince's Metal.—3 ounces of copper and 1 ounce of zinc, or 8 ounces of brass and 1 ounce of zinc.

Bell Metal.—100 parts of copper mixed with from 20 to 25 parts of tin.

Gun Metal.—100 pounds of copper and 12 pounds of tin, either with or without a little brass.

Best Hard White Metal for Buttons.—1 pound of Bristol brass, 2 ounces of zinc, and 1 ounce of block tin.

Common Hard White Metal.—1 pound of brass, 1½ ounce of zinc, and half an ounce of tin.

Bath Metal.—1 pound of brass and 4½ ounces of zinc.

A White Metal.—2 pounds of regulus of antimony, 8 ounces of brass, and 10 ounces of tin.

Hard Solder.—2 pounds of copper to 1 pound of tin.

Soft Solder.—Two-thirds of tin and one-third of lead.

Hard Pewter.—12 ounces of tin, 1 ounce of regulus of antimony, and 2 drachms of copper.

Tutania.—8 ounces of brass, 2 pounds of regulus of antimony, and 7 ounces of tin.

A Metal for Speculums or Mirrors.—Copper 32 parts, tin 15, brass 1, silver 1, and arsenic 1.*

CONDENSING STEAM.

Relative Quantities of Steam Condensed in Vessels with Bright Metallic and Blackened Surfaces.

Two cubical vessels of tin plate, of which the surface of one was bright, and that of the other covered with lamp-black, were connected with a steam-boiler, by tubes so inclined towards the latter as to allow all water obtaining from condensation in the tubes to return to it. The vessels were of equal dimensions, four inches wide; and the experiment was made in a close room, of which the temperature was 52°; that of the steam being at a mean of 215°. The water was withdrawn by cocks properly adjusted for the purpose; and at the expiration of seventy-two minutes, the bright vessel had afforded 5.7, and the blackened one 10.2 cubic inches. Now, supposing steam of this temperature to be 1,600 times rarer than water, in 24 hours the condensation from one foot of blackened surface would be 489600 cubic inches, or 1736 gallons of steam, and from an equal extent of bright metallic surface 273600 cubic inches, or 972 gallons. Hence the condensing energies of a blackened and polished metallic surface were to one another as 1736 is to 972. When the difference between the temperature of the heated body and that of the surrounding medium is greater, the effect will be proportionally augmented.

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* Richardson's Chemical Principles of the Metallic Arts.

But when currents obtain it is probable that the effect will be increased in both; but that the ratio of this increase will be greater for the bright than for the blackened surface.*

GOLD COINAGE.

Eleven parts of gold, that is, standard gold, the specific gravity of which is 19, when mixed with one part of copper, produce an alloy, the specific gravity of which is about 17; of this alloy, 20 pounds troy are coined into 934½ sovereigns, or 15 pounds into 700 sovereigns. One pound was formed into 44½ guineas, but now it is coined into 46 sovereigns.†

MUSICAL RECORDER.

The sounds of the human voice are the sweetest of all, and are produced by the vibrations of two delicate membranes situated at the top of the windpipe, with a slit or opening, called the *glottis*, left between them, for the passage of the air. The tones of the voice are grave or acute, according to the varying tension of these membranes, and to the size of the opening. In the *organ* there is a pipe for each note, and wind is admitted from the bellows to the pipes, by the action of keys, like those of a piano-forte. The organ may be played also very perfectly by a barrel, made to turn slowly under the keys, and to lift the keys in passing, by pins projecting from it at the required situations. Very complicated pieces of music are thus set on barrels, but at great cost of study and labour, and therefore of money: now a plain barrel, made to turn near the keys of an organ during performance on it by the hands, might be made to record with mathematical accuracy every touch of the most finished player, viz. by receiving marks of some kind from the keys as they were lifted.

* Brewster's Journal.

† Brande's Lectures.

To repeat with absolute accuracy, therefore, any performance, however delicate and exquisite, it would only be necessary to drive pins into the barrel where the marks remained, and afterwards to make these pins lift the keys. The author does not know that this idea has ever been acted on, or has ever occurred before.*

SUPPLY OF WATER IN LONDON.

(Abridged from the Report, printed by order of the House of Commons.)

For the whole population, on both sides of the Thames, there are eight water-companies, all of whom, with the exception of two, (the two largest ones indeed,) take their supply from the Thames, though under different circumstances—some of them taking it up more and some less pure; some of them purifying it in cisterns, ere they send it out to the public, and others not.

1. *The New River Company* get their supply chiefly from the spring at Chadwell, between Hertford and Ware. It comes in an open channel of about 40 miles in length, to reservoirs at Clerkenwell, which, the town having now stretched completely round it, must receive a considerable quantity of charcoal, coal-tar, and ammonia from the smoke. There are two reservoirs, having between them a surface of about five acres, and an average depth of ten feet. These reservoirs are eighty-four feet and a half above low-water mark in the Thames, and by means of steam-engines and a stand-pipe, an additional height of sixty feet can be given to the water, so that all the mains belonging to this company are kept full by a considerable pressure of water. The highest service given by the New River is the cistern on the top of Covent Garden Theatre. The aqueduct by which the water is brought has but little fall; thus it wastes by evaporation during the drought of summer, and is impeded by frost in the winter. At these times the company pump an additional supply from the Thames at Broken Wharf, between the Blackfriars and Southwark Bridges. To this, however, they seldom have recourse; and their engine, which they have erected only since the works at London Bridge were broken down, has worked only 176 hours in the year. The New River Company supply 66,600 houses with water, at an average of about 1,100 hogsheads each in the year, or, in all, about 75 millions of hogsheads annually.

2. *The East London Water Works* are situated at Old Ford, on the river Lea, about three miles from the Thames, and a little below the point to which the tide flows up the Lea. By the act of parliament, this company must take its water when the tide runs up, and the mills below have ceased working. The water is pumped into reservoirs, and allowed to settle; and a supply

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* Arnott's Physics.

of 6,000,000 gallons is daily distributed to about 42,000 houses. This company supply no water at a greater elevation than 30 feet, and the usual height at which the delivery is made to the tenants, is 6 feet above the pavement. They have 200 miles of iron pipes, which in some places cost them 7 guineas a yard. This and the New River are the only companies which do not draw their supply of water entirely from the Thames.

3. *The West Middlesex* derive their supply of water from the Thames at the upper end of Hammersmith, about nine miles and a half above London Bridge, and where the bed of the Thames is gravel. The water is forced by engines to a reservoir at Kensington, 309 feet long, 123 wide, and 20 deep; paved and lined with bricks, and elevated about 120 feet above low-water in the Thames. They have another reservoir on Little Primrose Hill, about 70 feet higher, and containing 88,000 hogsheads of water, under the pressure of which the drains are kept charged, in case of fires. They serve about 15,000 tenants, and the average daily supply is about 2,250,000 gallons.

4. *The Chelsea Water Works* derive their supply from the Thames, about a quarter of a mile east of Chelsea Hospital, and they have two reservoirs, one in the Green Park and another in Hyde Park—the former having an elevation of 44 feet, and the latter of 70. These reservoirs have never been cleaned, nor is any preparation made for that purpose in their construction. About one-third of the water served out by this company is allowed to settle in these reservoirs, and the remaining two-thirds are sent directly from the Thames. Latterly, however, the company have been making preparations for filtering the water, and also for allowing it to settle in reservoirs at Chelsea before it is delivered in the mains. The Chelsea Company serve about 12,400 houses, and the average daily supply is about 1,760,000 gallons.

5. *The Grand Junction Company* derive the whole of their supply from the Thames, immediately adjoining Chelsea Hospital; thence it is pumped without any filtration or settling into three reservoirs at Paddington. These reservoirs are about 71, 86, and 92 feet above the high-water mark in the Thames; their united contents are 19,355,840 gallons; and, by means of a stand-pipe, the water is forced to the height of 147 feet, or about 61 feet above the average reservoir. The number of houses supplied by the Grand Junction Company is, 7,700, and the average daily supply is about 2,800,000 gallons.

These five companies supply the whole of London and its environs north of the Thames; while the buildings and works south of the river are supplied by the three following:—

6. *The Lambeth Company* take their supply from the Thames, between Westminster and Waterloo Bridges. It is drawn from the bed of the river by a suction-pipe, and delivered to the tenants without being allowed to subside,—there being only a cistern of

400 barrels at the works, as a temporary supply, until the engines can be started. The greatest height to which the company force water is about 40 feet, the number of houses that they supply is 16,000, and the average service is 1,244,000 gallons daily.

7. *The South London* or *Vauxhall Company* take their supply from the river Thames by a tunnel, which is laid 6 feet below low-water mark, and as far into the river as the third arch of Vauxhall Bridge. At that particular place, the bed of the Thames is described as being always clean, and without any of those depositations of mud, and more offensive substances that are found in many other places. Besides the greater purity of the bed of the Thames here, than where any other company on the south side take their supply, the company allow the water to settle in reservoirs. The Vauxhall Company supply about 10,000 houses with about 1,000,000 gallons of water daily.

8. *The Southwark Water Works* (the property of an individual) are supplied from the middle of the Thames, below Southwark and London Bridges; and the water thus taken is sent out to the tenants without standing to settle or any filtration, further than that it receives from passing through wire grates and small holes in metallic plates. The number of houses supplied by these works is about 7,000, and the average daily supply about 720,000 gallons.

The elements of this supply will be better understood, by collecting the results into a table as follows:—

Companies.	Services.	Average per Day. Gallons.	Gallons Annually.	Average per House.
1. New River - -	67,000	13,000,000	4,056,000,000	182 + *
2. East London -	42,000	6,000,000	1,872,000,000	143—
3. West Middlesex	15,000	2,250,000	702,000,000	150
4. Chelsea - - -	12,400	1,760,000	549,120,000	142—
5. Grand Junction	7,700	2,800,000	873,600,000	363 +
6. Lambeth - -	16,000	1,244,000	388,128,000	77 +
7. South London -	10,000	1,000,000	312,000,000	100
8. Southwark - -	7,000	720,000	224,640,000	102 +
Total	183,100	28,774,000	8,977,388,000	157 +

Average per house north of the river 196 gallons.
Average ditto south - - - 93 gallons.

The total daily consumption of water, supplied by the companies, is, for all purposes, about 4,650,000 cubic feet, and would require a circular pipe of about six feet in diameter, flowing at the rate of two miles an hour, without any interruption.

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* (+) Means, that there is a fraction of a gallon more; (—) that there is a fraction less.

PRINCIPAL TUNNELS IN ENGLAND.

The first tunnel ever constructed in this country was on the Trent and Mersey Canal, for the Duke of Bridgewater; it is nearly 2,900 yards in length, and some parts are cut out of a solid rock; since that four others have been executed over the same canal of 131, 350, 573, and 1,241 yards each in length.

The Worcester and Birmingham canals have five tunnels; the largest 2,700 yards in length; the four others 110, 120, 400, and 512.

The Leeds and Liverpool canals have two tunnels of 1,530 and 1,000 yards.

The Leicester and Northampton canals have four tunnels of 286, 880, 990, and 1,056 yards.

The Leominster canal has two tunnels of 1,250 and 3,850 yards.

The Thames and Severn canals, one tunnel of 4,300 yards.

The Chesterfield canal, two tunnels of 2,850 and 1,000 yards.

The Crumford canal, one tunnel of 2,966 yards.

The Dudley and Owen canals, three tunnels of 623, 2,926, and 3,776 yards.

The Ellesmere canal, two tunnels of 487 and 775 yards.

The Hereford and Gloucester canals, three tunnels of 440, 1,320, and 2,192 yards.

The Edgebaston canal, four tunnels of 100, 400, 500, and 2,700 yards.

The old Birmingham canal, two tunnels of 2,200 and 1,000 yards.

The Grand Union canal, two tunnels of 1,165 and 1,524 yards.

The Grand Junction canal, two tunnels of 3,045 and 3,080 yards.

The Oxford canal, two tunnels of 1,188 and 750 yards.

The Huddersfield canal, one tunnel, very near four miles long, principally cut through a rocky mountain.*

FUSION OF TALLOW.

The Council of Health at Nantes has been engaged in an investigation of the best means of fusing tallow, so as to avoid the injury and annoyance which arises from an abundant liberation of vapours, when the ordinary method is used. Much pains has been taken in acquiring all the information possible, and numerous experiments have been made both on a large and small scale. The best process which the Council has instituted appears to consist in using, according to M. D'Arcet's suggestion, a certain proportion of sulphuric acid, and operating in close vessels. By the use of the acid, the fumes always evolved are very much altered and ameliorated in quality, at the same time that the fused tallow is improved in quality and increased in quantity, the fusion very much quickened, and the use of a press dispensed with.

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* The Mirror.

By the use of close vessels, the fumes evolved can be either conducted to a fire-place to be burnt, or, if that may be thought dangerous, in consequence of the occasional boiling over of the melting tallow, can be conducted into a condensing apparatus, which is found readily to condense them.

M. D'Arcet uses 100 parts of crude tallow in small pieces, 50 parts of water, and 1 part of sulphuric acid, sp. gr. 1.848. In some small experiments a digester was used, having a pierced copper-plate near the bottom to avoid the necessity of stirring; 1500 (3 lb. 5 oz.) parts of crude tallow, 750 of water, and 124 of oil of vitriol were used, and the fumes conveyed by a pipe into a fire-place; half an hour's ebullition completed the fusion. The infusible matter, when pressed in a cloth, weighed only 96 parts, and was slightly acid. The tallow was white, hard, and sonorous, and *not* acid. Without the acid, the same effect was not produced in an hour.

A tallow-manufacturer then tried the experiment with 2 cwt. of tallow, using the acid, but operating in open vessels; 92 per cent. of fused tallow was obtained, and 8 of loss occurred: in the ordinary way, 15 per cent. of loss occurred. In a second large experiment with acid, only 5 of loss occurred. The residue does not require the use of a press, but cannot be made into cakes for cattle, unless previously freed from acid by washing.

Experiments made on the condensation of the vapour was found to succeed very well, and thus all fear of injury from fire is avoided. The Council propose conducting the vapours into the drains of the works, and so condensing them there; no annoyance being apprehended from the occasional return of the vapours into the building, as that effect can be counteracted by the use of stink-traps.*

PECULIAR PULLEY.

In *fixed pulleys* there is no mechanical advantage, for the weight just moves as fast as the power; yet such pulleys are of great use in changing the direction of forces. A sailor, without moving from the deck of his ship, by means of such a pulley, may hoist the sail or the signal-flag to the top of the loftiest mast. And in the building of lofty edifices, where heavy loads of material are to be sent up every few minutes, a horse, trotting away with the end of the rope, in a level court-yard, causes the charged basket to ascend to the summit of the building as effectually as if he had the power of climbing the perpendicular wall with it at the same rate.

There is a case, however, in which a fixed pulley may seem a balancer of different intensities of force, viz. where one end of a rope is attached to a man's body, and the other is carried over a pulley above, and brought down again to his hands; for safety, this end also should be attached to his body. By using the hands then to pull with force equal to half his weight, he supports himself, and may easily raise himself to the pulley. A man, by a pulley thus employed, may let himself down into a deep well, or from the brow of a cliff, with assurance of being able easily to return, although no one be near to help him; and cases have often occurred where, by such means, a fellow-creature's life might have been saved, or other important objects attained. How easily, for instance, might persons either reach or escape from the elevated windows of a house on fire, by a pulley which might readily be found and carried where ladders could not be obtained! Such a pulley furnishes a convenient means of taking a bath, without assistance, from a ship's stern windows, &c.*

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* Annales de l'Industrie.

NEW RAZOR STRAPS.

A NEW kind of razor strap, invented by M. Ferrot, has received the name of *euthegone.* From the flexibility of leather, a round edge is given to the blade, for which reason paper is used in the new strap. Two kinds of very fine paper have been manufactured purposely, with fine and homogeneous pulp, mixed in the one case with fine emery, and in the other with very fine rouge. These papers are then steeped in melted tallow, afterwards pressed to give them a smooth surface, and then cut into bands, and mounted on pieces of wood properly shaped. Each strap has therefore two faces, one gray, on which the razor may be rendered very sharp, and the other red, which, polishing the edge, renders it extremely smooth. The razor must be laid very flat upon these straps—they improve by a few days use. When ineffectual from age, the surface should be rubbed with a very smooth piece of pumice, or with a little pumice-powder on marble or ground glass; being then wiped with a piece of cloth, they are brought to their first state.†

ARRANGEMENT OF WATER-PIPES IN STREETS.

THE effect of temperature upon iron pipes, used for the conveyance of water, and also some other circumstances, have been investigated by M. Girard, who has arrived at the following conclusions:—1. According to the effect produced by change of season and temperature upon pipes of this metal placed in subterraneous galleries, they altered in length for each centesimal degree (1.8 degrees of Fahr.) 0.0000985, a quantity about 1-9th less than it would have been if they had not been confined on their supports by friction. 2. Although this effect is less when the pipes are put in the ground, it is still sufficient to occasion rupture, leakages, and other unpleasant accidents. 3. If the joints are not made by bolts, but one end of a pipe is inserted into the mouth of the next pipe, then the space for the interposed substance should be as small as possible, and the substance one which swells when in contact with water. 4. The length of the joints should be considerable, both to prevent the escape of water and the flexure of the system of tubes. 5. To ensure tightness, the stuffing should be confined between a ring fixed to the end of the pipe, and a movable ring sliding on the tubes. 6. That this precaution may be dispensed with by laying the pipes down in the coldest part of the season. 7. That pipes put into the ground should be supported at intervals by firm props of masonry, to prevent those inflexions which otherwise occur, and form ruptures. 8. That in large towns it is advantageous to place these pipes in subterraneous galleries, either such as are made on purpose, or else in the sewers. 9. That galleries have been tried advantageously for 20 years, and therefore should be resorted to, that those derangements of the pavement and inundations from broken pipes which are consequent upon the ordinary mode of proceeding, may, from henceforth, be avoided.*

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* Arnott's Physics.

† Bull. Soc. Encouragement des Arts.

POWER-LOOM WEAVING.

The progress of power-loom weaving was not at first so rapid as might be expected. This arose partly from the imperfections that originally attached to the machine, but chiefly from the circumstance of its being necessary to dress the webs from time to time after they were put into the looms, which made it impossible for one person to do more than attend to one loom. But a beautiful machine, invented by Mr. Thomas Johnson, of Bradbury, for warping and dressing the yarn used as warps, has completely obviated this difficulty; and, at this time, a boy or girl of from 12 to 14 years of age can with ease attend to two power-looms; and can, by their means, produce three times as much and well-woven cloth, as could be produced by the best hand-weaver. This machine is known by the name of Radcliff's Dressing Machine, from the exertions made by Mr. Radcliff, of Stockport, to have it made effective. But Mr. R. has no claim to that invention.†

SUSPENSION BRIDGES.

A new mode of constructing suspension bridges has been recently introduced into Scotland. The chains or rods are placed below, and the weight rests on the rods by means of cast-iron brackets, on which the beams are placed. The rods, which are of chain iron, are bent round the ends of the beam, and fastened with a hoop of iron to prevent springing. Buckling screws are placed on the rods near the brackets, for the purpose, of lightening the rods and raising the beams to the level, so that the whole structure can be adjusted with the greatest ease. From the construction, it will be easily seen that the whole weight or pressure is exerted on the iron rods or wires, in the direction of their length, so that they have no tendency to break or bend in a lateral direction. The amazing strength that this mode of connecting the ends of a wooden beam imparts to it, may be illustrated by a very simple experiment. Let the mechanic take a piece of wood, about 2 or 3 feet long, and an inch in diameter; place the ends of it between two chairs or stones, and attempt to stand upon it, and he will find it break almost instantaneously. Let him now take a similar piece of wood, and bend round the two ends, a piece of wire so much longer than the wood as to allow a small wedge, or wooden pin, 2 or 3 inches long, to be placed vertically between the wood and the wire, and he will find that he will be unable to break it, though he leap upon it with all his force. The application of this principle may be seen in all cases where brackets and trussed beams are employed, though it has been seldom, perhaps, carried to the extent which it obviously admits of.*

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* Le Globe. † Mech. Mag.

SIMPLE METHOD OF CUTTING ORIGINAL SCREWS.

The following is a simple and economical method of cutting original screws:—

You must leave the piece of steel, from which you intend to form your tap, a little longer than necessary, and having turned it true throughout, at one end turn down, somewhat lower than the rest, a neck or space about half an inch in length; round this space coil a piece of wire, and you will at once be in possession of a primary, artificial guide, which will regulate the pitch of your intended screw. You have now nothing to do but to make your tracing-tool to the spiral grove formed by the wire, and begin tracing your thread.

By this simple method, you may obtain, by varying the thickness of your wire, a screw of any required pitch, either right hand or left, without a traversing chuck, traversing mandrill, or any such difficult process and expensive apparatus.†

EXTRAORDINARY FEAT IN TURNING.

A correspondent of the *Mechanics' Magazine* writes thus:—

Some weeks ago, I observed in a newspaper the following paragraph:—"Mr. Peter Taylor, cabinet-maker and turner, of Dunmow, lately undertook to turn 18 pairs of 5-feet tent bed-pillars, top and bottom, in a workmanlike manner, within twelve hours. The pillars and his turning lathe being properly prepared the evening previous, he commenced this great undertaking a few minutes after six o'clock; and, notwithstanding the interruption of a full hour, by the iron-work of the lathe becoming so heated and swollen as to require alteration, he completed his work twenty-five minutes after five o' clock; being, perhaps, one of the greatest efforts of the kind ever attempted by one man."

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* The Verulam.

† Mech. Mag.

Being in Dunmow a short time since, I called upon Mr. Taylor, and obtained a sight of the pillars, as they were turned out of his hands on the above occasion. As far as I could judge, the work was extremely well executed; neither was it of so plain a description as might be supposed, for the posts were throughout of the reeded fashion. The wood too was a hard beech, the posts being taken out of a lot of quarters promiscuously. Mr. Taylor sharpened all his own tools, and put into the lathe, took out, and centred, every pillar himself. Each pillar was collared, to render it steady, and prevent it flying out of the lathe. They were papered off in the lathe, and finished as they usually are done. The chuck being a new one made for the occasion, it heated after about one third of the work was done, and occasioned great delay and labour during the turning of the remainder.

I think an effort like this ought to be made public; for, as far as I can learn, 5 or 6 pairs are considered a full day's work, and but few can accomplish that number, and I consider it the most simple yet the most efficacious I ever saw, and the least liable to get out of order.

TYPES FOR THE BLIND.

The Gold Vulcan Medal of the Society of Arts has been presented to Mr. G. Gibson of Birmingham, who, being himself blind, has invented a set of types, whereby he can write down his thoughts, perform arithmetical operations, and communicate the results of them not only to those who can see, but to persons labouring under the same privation with himself. His apparatus consists of a number of cubes, on the top of which are formed, in relief, sufficiently high to be distinguishable by the touch, the figures of the letters, of the numerals, and of other characters that he may have occasion for. On the bottom of each cube, the figure that it bears on the top is represented by needle points, projecting about a tenth of an inch. If, therefore, a piece of paper be laid on a hard flat cushion, and one of the cubes formed, as above described, be pressed upon it, the points will penetrate the paper and will form on the under side a visible, and at the same time a tangible representation of the figure, by means of the burs or prominences wherever the points have passed through.*

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* Register of Arts.

STEAM FERRY-BOATS.

Capt. A. M'Konochie, has communicated to "Jameson's Edinburgh New Philosophical Journal," an important paper on the most effective use of steam power in maintaining a ferry. "There are two ways," says the author, "in which steam may be thus employed. An engine may be embarked in a large boat fitted to receive passengers and goods; and this method has exclusively been adopted in Scotland. Or it may be embarked in a tug-boat, and employed to tow over large passage vessels, given up entirely to the reception of freights. It is believed that this last is very much the better way; and it may be observed, as presumptive evidence of this, that it has lately been introduced on a great scale, and as a great improvement in America.

The precise system suggested by Capt. M'K. is the following: "Two tug-boats of great power to be kept; and several, perhaps on a principal ferry as many as six, decked passage vessels of different sizes, but all properly equipped for the comfortable accommodation of passengers, horses, carriages, &c. The first to be plied, one at a time, unless when extraordinary circumstances of weather or passage require both; the last to be used one or more, large or small, as the same circumstances may direct."

The author then proceeds to enumerate the advantages which would result from his system, among which are economy, public convenience, and safety.

"The passengers," says he, "would be greatly safer and more comfortable in a vessel by themselves, than they can possibly be when embarked with a steam-engine. However constructed, a steam-boat can never be altogether safe or comfortable as a conveyance. A small neglect of the machinery may at any time cause a great calamity; the chances of such neglect are greatly multiplied by the presence of passengers on board, and by their occasional curiosity; in the event of collision with any external object, the weight of the engine aggravates the shock; and if a hole is made in the boat, she goes down like a stone. On the other hand, the very nature of the engine makes a steamboat roll; if she carries a cargo on deck, this effect is increased —her funnel is all additional top-weight; and the heat, smell, smoke, dirt, and jarring, caused by the engine, are all evils in their way, and at least aggravate in no small degree the pains of sea-sickness. Not any one of these circumstances, however, would operate in passage-vessels. With the means on board of anchoring, passengers would be safe in them, whatever happened; and where every corner is given up to accommodation, a thousand conveniences might be introduced, which are at present unthought of.

"Upon the tug-system, high-pressure engines might be again introduced into steam-navigation, and their advantages secured without alarm to passengers. These advantages are greatly undervalued in this country;—they consist chiefly in original cheapness of construction, diminished expense of working, superior lightness (nearly as 4 to 5;) but, above all, in command of high power, not for current use, but in reserve against occasions when it may be required. In low-pressure engines there is no such reserve; beyond a certain limited point, an increased fire only fatigues the machinery, without adding one jot to the useful effect: yet in every species of navigation, it is important to have it; in ordinary cases it is furnished by the *morale* of the seamen, and in steam-navigation, it ought, if possible, to be within the *physique* of the engine.*

DRAWING INSTRUMENT.

A DRAWING instrument, invented by Mr. Ronalds, was explained at the evening meeting of the Royal Institution, March 28. A pencil and a small bead are so connected together by means of a thread passing over pulleys, that if a person, looking through an eye piece, will hold the pencil upon a sheet of paper, and then watching the bead will move his hand, so that the bead shall trace the lines of any object that is selected to be looked at, he will find that, whilst he has been doing this, he has also made a drawing of the subject upon the paper; for the pencil and the bead describe exactly the same lines, though upon different planes. Thus a drawing is made without ever looking at the paper, but solely at the object.†

MUSICAL SOUND.

AT the Royal Institution, on the 9th of May, the following lecture was delivered by Mr. Faraday, but supplied by Mr. C. Wheatstone.

Musical sounds differ from noises in their quality of pitch, a quality usually expressed by the terms high and low, grave and acute. So essential is pitch to a musical sound, that it alone renders the sound subject to the laws of melody and harmony. However sounds may differ in other qualities, and those of a bell, a harp, and a flute may be taken as instances, yet agreeing in this, the most unpractised ear can perceive their relation and musical nature.

Galileo first correctly indicated the nature of the pitch of sounds, and showed that it depended altogether upon the number of vibrations or impulses made by a sounding body in a given time. Thus, if two strings be taken, and one made to vibrate faster than the other, it will yield a sound of a higher pitch; and if it vibrate twice as fast, its note will be an octave higher than that of the other string.

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* To meet this occasional addition to the working power of the engine, it would not probably be difficult to contrive paddles which should expand and contract at will; it is not unlikely, indeed, that they are already contrived. Lieutenant Skene, of the navy, has lately patented a form of paddles, of which I have not seen the specification; but the praise given them by the newspapers, when they were tried on the Thames, seems unintelligible on any other supposition.

† Brande's Journal.

All sounds are produced by impulses or vibrations, which are usually communicated to the auditory nerves, through the medium of the atmosphere, and these produce an effect according to the number of impulses in a given time. If there be less than thirty impulses in a second, no sound is produced; gradually increasing the number, low sounds are heard at first; but they become higher as the impulses are more numerous in a given time, until, when above 14,000 in a second, the sounds are so acute as to be inaudible to ordinary ears. Whenever the impulses are regular and with any constant velocity, then a sound is produced, having a constant and determinate pitch. A very curious experiment, made by Galileo, and described in his dialogues, was quoted, which seems to have been forgotten since his time. It consists in drawing the blade of a penknife over a plate of copper sideways, so as to produce sounds; at the same time it is found that a series of indentations are marked on the copper, which indicate the successive impulses which produce the sound; they are extremely regular, and the number of them will be seen, upon examination, to correspond with the pitch of sound. Mr. Wheatstone has remarked, that in all cases of sound from friction, as when a bow is drawn across the strings of a violin, the same series of impulses are produced, and may be rendered evident, by fixing a small steel bead upon the bow; when looked at by a light or in sunshine, the bead seems to form a series of dots during the passage of the bow.

Hooke performed an experiment, in which a toothed wheel was made to revolve, and a card or quill held against the teeth; sounds were produced having a regular pitch, according to the number of blows or impulses given upon the card in a certain time. The notes produced in this way in the lecture were very distinct, and well characterized as to pitch, more especially the higher ones.

Professor Robinson produced the same effect by impulses given to air alone. This was done by blowing air through a stop-cock whilst the plug was rapidly revolving; and as the motion of the plug was more or less rapid, so the tones produced were higher or lower.

An instrument was invented some years ago by M. Cagniard de la Tour, which gave very beautiful results confirmatory of the above views, and one of them was prepared and experimented with at the lecture table. It consisted of a box, into the bottom of which a pipe was fixed, to blow air through, and in the top of which were formed sixty holes, placed in a circle, and equidistant from each other. A metallic plate was fixed on an axis over the top, so as to be made to revolve at pleasure, and was also perforated by sixty holes coincident with those in the box. When the plate was made to revolve, the holes in the box were, therefore, opened and closed sixty times in each revolution; and when air was blown through the box, musical sounds were produced, having a determinate pitch, dependent upon the rapidity of the plate, or rather upon the number of impulses given to the air by opening and shutting the exit passages a given number of times in a second.

A striking point in the character of this instrument is, that whether air or water be passed through it, still the pitch of sound is the same for the same velocity of the plate, being not at all altered by the density or rarity of the substance upon which the impulses are given.

A small musical instrument, recently invented in Germany, was then produced, in which the sounds were caused by successive impulses upon air, like as in the stop-cock of Professor Robinson, or the Syren of Cagniard de la Tour, except that, though simpler in practice, the method was more complicated in principle. It was called the Mund Armonica, and consisted of a plate of metal having small rectangular apertures, about half an inch in length, cut in it side by side; there were eight of these holes, and each was furnished with a thin elastic plate of metal, which being fastened at one end of the hole, was so adjusted in size as to vibrate freely in the aperture, which it nearly filled. When the mouth was placed over one or more of these apertures, and air urged forward, it caused the spring to vibrate as it passed it; these vibrations produced so many impulses upon the current of air, and thus caused sound. The plates are adjusted by their thickness, rigidity, and other circumstances, to produce a certain number of vibrations in a given time, and so determine the pitch of sound. The notes produced were very beautiful and clear, having much of the character of those of the Æolian-harp.

It was stated that the Eol-harmonica, a keyed instrument, brought from Germany into this country by Mr. Schulz, was constructed upon this principle. Mr. Schulz and his sons, who were present, illustrated the powers and effect of this instrument by various performances.

The principle of the Mund Armonica is distinctly described in Professor Robinson's works, p. 538, &c., where he suggests that it will probably be found highly useful in the improvement of musical instruments.*

EFFECTUAL CURE FOR SMOKY CHIMNEYS.

Mr. Mordan, the patentee of the ever-pointed pencils, has invented a contrivance for preventing his kitchen chimney from smoking, and also for quickly exciting fire, without the aid of bellows.

His fire-place, like many others, had a wide open chimney to it, and was continually annoying his family by smoking. He determined, therefore, to contract the throat of his chimney in the following judicious manner:—He caused the entire opening at the bottom or throat of the chimney to be closed up, with the exception of an upright flue, just above the top of the grate, about a foot wide and high, which led into the chimney. To the face of this flue he applied a square flat frame of wrought-iron, having upright grooves made on each side of it, in which a sort of hood, made of sheet-iron, could slide up and down. This hood is open behind, and projects about a foot square in front of the chimney back, over the fire-place or grate, and is sloped off at its top, towards the back of the chimney, and it has a handle in the front of it to raise and lower it by.

When the hood is elevated, it serves to guide the smoke and heated air into the upright opening leading into the chimney, its sides being closed to fit the upright back of the fire-place; and the fire then burns in the usual manner, but the chimney never smokes. When, however, he wishes to excite the fire at any time, he lowers the hood until its bottom nearly reaches down to the tops of the cheeks, or two keepers of the grate, and the fire, by the draught thus caused, instantly revives. In addition to this hood he likewise occasionally hangs upon ledges, formed upon each side of it, an appendage made of sheet iron, which lengthens it so that its sides fit close upon the tops of the keepers, and thus the air can only gain access to the fire through the front and bottom bars of the grate, and then, indeed, the fire burns most vehemently.*

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* Brande's Journal.

IMPROVED CARRIAGE AXLETREES AND BOXES.

Mr. Mason has lately employed his mechanical skill in the perfecting of the *common* axletrees and boxes for carriages of all descriptions. The arms being made truly cylindrical from end to end, well polished, and accurately fitted with his improved cylindrical patent cast-iron boxes, with four longitudinal grooves inside of them, for containing grease, which, continually circulating around the arms, lubricates them most completely; and both the arms and the boxes being made as hard as possible, they will run for several hundred miles without requiring to be taken asunder, or to be fresh greased; and indeed whenever that operation becomes necessary, any coachman is capable of managing them as readily as the ordinary ones.

There is also a new provision made for letting the wheels out when necessary in bad roads; this is effected by forming an upright elongated hole through the screwed ends of the arms; and making the screwed nuts either 6 or 8 square, there are holes made through each square, for the linch-pin to pass through both the nut and the arm; so that each thread or turn of the screw is thus subdivided into 6 or 8 equal parts, by which means the wheels can be let out and secured with greater nicety than usual.

These valuable improvements are nevertheless not productive of any additional expense, as the new axletrees and boxes are afforded at the same prices as the ordinary casehardened axletrees with wrought-iron boxes.†

NAVAL ARCHITECTURE IN BRITAIN.

During the month of May last, Mr. Knowles delivered at the Royal Institution, two interesting lectures on the rise, progress, and present state of Naval Architecture in Britain, of which the following is an abstract.

He prefaced his first lecture (delivered on the 2nd of May,) by adverting to the commercial and other advantages which this country has derived from ships; and in order that the terms which he used might not be misunderstood by his hearers, he gave a succinct account of the leading principles of the science of their construction.

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* Gill's Repos.

† Ibid.

To find the displacement of a ship is of the highest importance; hence mathematical and mechanical means have been devised to arrive at the fact, all of which have given way to a method introduced by Chapman, a Swede, which is derived from the parabolic curve, to which the lines of ships' bodies approximate.

Stability is that property in a floating body which it exerts to retain or regain an upright position when under the influence of any force which tends to incline it. The comparative stability of ships may be judged by the distance of their centre of gravity from a point called the metacentre; this was a discovery of Bouguer. Chapman has also given an easy but elegant method of finding this point, by a formula derived from the parabolic curve.

The little which is correctly known of the resistance of fluids was adverted to, and a remark made, that an important fact has resulted from these inquiries; that, *cæteris paribus*, the resistance which floating bodies meet with in passing through a fluid, is as the respective areas of their broadest section, and that the resistances increase as the squares of the velocity.

The relative proportions of masts and yards to the stability of ships, and to the resistance to be overcome, next came under consideration; and as the stability of ships increases with regard to their breadth in a geometrical ratio, while, with respect to length, it increases only arithmetically, so the length of the masts are governed by the breadth of the ship, and the spread of yards by their length. The general position of masts in ships of war was stated to be, for the foremast 1-9 of the length of the ship from the stern, the mainmast 5-9, and the mizenmast 6-7; the length to be taken at their line of flotation.

The best proportion of length to breadth of three-masted ships is 3 75 to 4 times their breadth; for length in brigs, 3.27 times their breadth for length; and cutters only 3 times as long as they are broad.

The foundation of the naval power of England was laid by Alfred, who, to prevent invasion, designed himself a fleet of galleys which were, in size and every other respect, superior to those of his opponents. This wise policy enabled him to carry into effect his plans for the internal improvement of the kingdom.

Mr. Knowles carried on the history through the succeeding reigns, and showed that England was prosperous, or otherwise, as the navy was encouraged or neglected.

During the reign of Edward I., the galleys were substituted by larger ships, called galleons; these, however, were rude in form, fitted with one mast only, and little capable of navigation, unless they sailed in the direction that the wind blew: these ships were fitted with regular castles for the reception of archers or cross-bow men.

Naval architecture and naval science, shortly after this period, underwent a complete alteration; for in 1302 the compass was discovered by Gioija; and in 1346 cannon were introduced into the field and shortly after into ships; these circumstances combined, brought about a great increase of size in our ships of war, as it required them to be larger than had formerly been used, to carry the guns; and the compass enabled men to put fearlessly to sea into deep water, and not confine themselves to coasting.

Henry VII. was the first king, since Alfred, who constructed ships expressly for naval warfare; he laid down a memorable ship, the Great Harry, which, however, was not completed till the succeeding reign. This ship measured 138 feet in length, and 36 feet in breadth, and carried 80 guns of different calibre. The Great Harry had four lower masts and a bowsprit, a round bow, and projecting prow; she had castles forwards, amidship, and abaft, making four on each side.

Henry VIII. paid great attention to the navy, and established the dock-yards at Woolwich, Deptford, and Portsmouth, and appointed a navy board for their management.

Elizabeth was equally attentive as her father had been to naval affairs; she ordered that guns of the same calibre should be carried on the same deck in all ships;—she also founded the dock-yard at Chatham. During her reign the chain-pumps, capstans, and other improvements were introduced.

James I. continued the same politic views, and appointed Mr. Phineas Pett, a graduate of the university of Cambridge, to the situation of naval constructor. This able man built the Prince Royal, Sovereign of the Seas, and other ships, upon scientific principles, and carried naval architecture, during this and the next reign, to a great height.

Mr. Knowles commenced his second lecture (May 16,) by stating, that the ships during the Commonwealth were not increased in size, but greatly in number, for in nine years the navy was doubled. In 1649, the first frigate which this country possessed was built; she was constructed by Mr. Peter Pett, and called the Constant Warwick; she carried 42 guns, but was only 85 feet long, and 26 feet broad.

The navy was much neglected by Charles II.; in his reign, however, the first ship to carry 74 guns (the Royal Oak) was built; this ship was 157 feet 6 inches long, and 41 feet 4 inches broad. The dock-yard at Sheerness was commenced at this period. James II. paid much attention to the navy; and, with the assistance of Mr. Pepys, carried many wholesome regulations into effect. At the abdication of James, the fleet was in a good state. William and Mary increased it in numbers; and in order to provide for its future resources, established a dock-yard at Plymouth. At this period the doubling or girdling of ships was first introduced.

Queen Anne gave her whole attention to the efficiency of the army,—the navy was consequently neglected, which caused great murmurs among the people. George I. increased the size of the ships of the several classes, and took vigorous measures not only to build and rebuild ships, but to repair those left in a bad state by his predecessor.

George II. still further increased the size of the ships, and added to their numerical force. It was during his reign that the practice of building 80-gun ships on three decks was discontinued, and those of 60 and 50 guns were no longer considered of the line. At the demise of George II. it was found that the navy had been doubled in real force during his reign.

The ships were much increased in size during the early part of the reign of George III., and the constant naval warfare carried on caused a more than ordinary attention to the fleet. In 1783, it was determined that copper bolts and copper nether hinges (called pintles and braces) should be substituted for those of iron; and it was apprehended that several ships had foundered at sea from the oxidation of the iron bolts, in consequence of the ships being copper sheathed; this was then attributed to the iron being a less pure metal than copper; for it remained for the master-mind of a Davy to discover the physical law, that when two dissimilar metals are in contact, and also with sea water, that a voltaic effect is produced, which occasions a rapid corrosion of the more oxidable metal, while the other remains perfect. "I have great satisfaction," said Mr. Knowles, "in having the opportunity of mentioning this, from a place in which this brilliant discovery was made, which was alike honourable to the talents of our eminent philosopher, as it is creditable to the liberality of the members of this institution, who afforded the means of his experimenting, by their excellent and extensive apparatus."

After the American war the fleet was put into good condition, and some large and excellent ships built. The Prince, of three decks, was cut asunder, and 11 feet in length added to her midship capacity; the same thing was done to the Hibernia and Ocean, first rates then building.

In 1793, Mr. Rule (afterwards Sir William Rule) was appointed surveyor; he planned some excellent ships, among which was the Caledonia of 120 guns, which now serves as a model for our first rates. The lecturer eulogised this gentleman as one who possessed every requisite to fill the situation, to which he had been appointed, with credit to himself and advantage to the country. And he remarked that this was "an era in naval science, for a nobleman was appointed by the king to conduct the naval administration of the country, who was initiated in scientific pursuits, and appreciated their influence in the useful arts. In consequence, the talents of Bentham, Brunel, Barrallier, and others of lesser note, were brought into action; our dock-yards were improved, the most powerful and useful machines introduced, and some ships constructed upon scientific principles."

"To whom, then do we owe these and other advantages which our navy and dock-yards have derived?—to a nobleman, to praise whom before the members of this institution would be arrogance, as he is above all praise of mine; and as they are so well acquainted with the splendid talents and private worth of their late president, Earl Spencer."

The present method of constructing ships, as invented by Sir Robert Seppings, was compared, step by step, with that formerly practised, and the great advantages shown which have resulted from the use of the diagonal framing in the hold, the shelf-pieces, thick waterways, iron-clasp knees, and truss-pieces between the ports.

The lecture was concluded by showing that all the advantages which naval architecture and naval science have derived at different times, have arisen from the writings or inventions of men of science, and not from mere practicians. Models of a galley, such as were constructed by Alfred; of the Great Harry, built in the reign of Henry VIII.; the Sovereign of the Seas, by Charles II.; the Bristol, constructed in 1657; the Britannia, in 1719; and Caledonia in 1808, were exhibited: also models of Sir Robert Seppings's mode of ship-building, with the round bows and circular sterns.*

NEW SHOT.

On May 23rd, at the Royal Institution, Mr. Brockedon gave some account of a new method of projecting shot, which had been discovered by Mr. Sieviere the sculptor. Mr. Sieviere had furnished Mr. Brockedon with a report of his earliest experiments, and to some of a later date Mr. Brockedon was an eye-witness. The discovery was accidentally made many years since by Mr. Sieviere, who was one evening amusing himself with a pewter syringe, which he had converted into a cannon, having closed the

* Brande's Journal.

discharging end of the syringe, and made a touch-hole. Into this cannon he put some pinches of gunpowder, and discharged the piston from it which fell harmless at a short distance; happening to invert the order of firing by holding the piston, the syringe was discharged with so much violence, as to pass through the ceiling and floor into the chamber above that in which he sat. He was struck with the prodigious difference of effect producéd, and immediately had a shot cast, which in form was like a mortar; this he fired from a solid mandrel, or bar swung upon trunnions, and capable of elevation and adjustment. His experiment succeeded so entirely, that he was induced to make a shot with radiant bars, which, though they added little to its weight, added much to its power of destruction to rigging. &c. The weight of this shot, which was of cast iron, was 15 pounds; this was discharged through a bank of clay 6 feet thick, and fell 20 yards beyond it. When fired again, it hit point blank at a distance of 175 yards, and was buried above 3 feet in the bank; the chamber of this shot, with which a touch-hole communicated, was precisely like that of a mortar, and when it was placed for firing upon the mandrel, the shoulder of the chamber at the bottom of the calibre rested upon the end of the mandrel. The chamber contained a charge of 1 and a half ounce of gunpowder. An experiment was made with a shot which weighed 25 pounds, but a charge of 2 and a quarter ounces of gunpowder was so great as to burst it, and to throw a fragment 5 and a half pounds weight to a distance of more than a quarter of a mile. Subsequent experiments with shot of wrought and cast iron of different forms, confirmed the fact, that shots discharged with the magazine within them were projected with a force greatly exceeding that which the same quantity of gunpowder applied in the usual way would effect.

As the expense of trying experiments with Mr. Sieviere's engines is too great for an individual to incur, the probability of its becoming a most destructive engine in warfare ought to recommend it to the serious attention of government.*

TINNING OF CAST IRON WEIGHTS.

THE weights are first to be cleaned in diluted sulphuric acid of specific gravity 1.14 or 1.116, and then put into clean water; they are then to be transferred into an aqueous solution, containing one-eighteenth of sal ammoniac. In the mean time pure fine tin is to be fused, and copper added to it in the proportion of 3 ounces to 100 pounds of tin; it is best to fuse the copper with 6 ounces of tin first, and then add it to the rest. When the tin is sufficiently heated, but not so highly as to prevent its adhering to the iron, the weight is to be plunged into it, and the tin will adhere perfectly. If the weights are to be polished, they should be first turned in the lathe; when thus turned, they are preserved from oxidation, are easily kept clean, and may be used instead of copper weights.*

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* Brande's Journal.

HARDENING OF STEEL BY A CURRENT OF COMPRESSED AIR.

From the observation of travellers, that the manufacture of Damascus blades was carried on only during the time when north winds occurred, M. Anozoff made experiments on the hardening of steel instruments by putting them, when heated, into a powerful current of air, instead of quenching them in water. From the experiments already made, he expects ultimate success. He finds that, for very sharp-edged instruments, this method is much better than the ordinary one; that the colder the air and the more rapid its stream, the greater is the effect. The effect varies with the thickness of the mass to be hardened. The method succeeds well with case-hardened goods.†

THE PENDULUM.

On November 15, 1827, a paper was read, before the Royal Society, entitled, "Experiments to determine the difference in length of the seconds' pendulum in London and Paris; by Capt. E. Sabine, Roy. Art., F.R.S."

The author commences this paper by a brief statement of the existing state of the determinations of standards of length in the two countries; and he observes that an attempt made by M. Arago in 1817 and 1818, to bring into immediate comparison the standards of the two countries, proved inconclusive, from the rates of the pendulums not having been obtained with sufficient exactness. The author having obtained from his grace the master-general of the ordnance a general leave of absence from his military duties, so long as he could be usefully employed in scientific pursuits, conceived he could in no way better satisfy the condition than in carrying into effect this purpose. Accordingly, being provided with two pendulums, one made by M. Schumacher, another the property of the board of longitude, he set out for Paris, whither the pendulums were forwarded to him. The comparison was made at Paris, at the Royal Observatory, in the Salle de la Meridienne, on the spot in which M. Biot's measurement had been made, and every proper facility and assistance was afforded him. The coincidence clock was compared every twelfth hour by M. Mathieu, with the transit clock of the Observatory. On the 27th of April the weather having set in mild and steady, the experiments were begun. The results are stated in the form of appended tables, of which a detailed account is given.

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* Industriel. † Bull. Univ.

Each of the pendulums, when not used in observing coincidences, was employed in determining its rate by a journeyman clock or counter, a method used by Messrs. Freycinet and Duperrey; but which the author thinks inferior to that of coincidences, though capable of giving good results. The particulars of these are given in two of the tables. From all the experiments in conjunction, it appears that the numbers of vibrations performed in a mean solar day at Paris (reduced as usual) by the two pendulums, were respectively 85922·06 and 85933·83.

The pendulums and apparatus were reconveyed to London, early in September, by water; and the rates again determined at Mr. Browne's house, in Portland-place, by means of that gentleman's excellent clocks and transit observations made by Capt. Sabine. The precautions used are fully detailed; and the observations, which are also appended in a tabular form, the author being assisted by M. Quetelet, of Brussels. They give it as a final result 85933·29 and 85945·85 for the numbers of vibrations respectively made by each in a mean solar day, similarly reduced for London.

As a final result of the whole operation, the author regards 12s.00 as the acceleration of the seconds' pendulum, in passing from Paris to London. The same acceleration deduced from a comparison of M. Biot's and Capt. Kater's direct measurements of the seconds' pendulum, in Paris and in London, comes out 11s.76; or conversely, the length of the seconds' pendulum observed by the former in London transferred to Paris, by an assumed retardation of 12s., gives a length differing from M. Biot's by 0in.00023. Borda's agrees within 0in.00079 with M. Biot's; and Capt. Kater's, so transferred, holds very nearly a mean between the two, but approaches rather nearer to Biot's than to Borda's.*

WATT'S SOLAR AND LUNAR COMPASSES.

Mr. Watt has lately described, in the philosophical journals, what he calls solar and lunar compasses. The following seems to be the last improvement:—Stretch a circular disc of dark-coloured velvet of about 4 inches diameter upon two very thin slips of light wood, or upon two feathers placed across each other at right angles; render about 25 grains weight of pure filings of steel magnetic by putting them between the folds of a piece of paper and drawing the ends of two magnets about thirty times across them. Rub the filings over the whole face of the velvet disc, they will then sink into the spaces formed by the piles of the silk. Let this be affixed to the end of a very light bar of wood, or to the opaque part of a writing quill 4 inches long, by a fine needle passed through the disc. Make a small perforation in the wood or quill at the distance of one-third of its length, measuring from the point at which the disc is attached; press a small agate or glass capsule into the aperture without any wax or fixture; the elasticity of the wood or quill keeps it sufficiently firm; balance it on a fine steel point, and let a cover be put over it. This instrument moves to the influence of the solar beam from morning to evening in our shortest days, even when the thermometer stands at freezing, and though the rays fall upon it through the glass of a window and the glass of the cover; the motion of the balancing bar is as slow, equal, and constant, when the sky is clear, as the shadow of the gnomon of a dial. Mr. Watt has also observed, he says, that this instrument and several other bodies clearly indicate by their motion the attractive influence of the lunar beam.*

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* Philosophical Magazine.

ESCAPEMENTS FOR TIMEKEEPERS.

At the Royal Institution, April 18th, Mr. Ainger described and illustrated the various escapements for timekeepers.

His object, he said, was to explain, by means of very enlarged models, the principles and action of those ingenious and beautiful contrivances which in general are little understood, because of the minuteness of their parts and the rapidity of their motions, which render their mode of operation in machines of the ordinary size too obscure and transient to be understood by mere inspection. To obviate this difficulty a model was made 3 feet in diameter, of the wheel called the escape wheel, which in common clocks is not as many inches in diameter, and in watches is of course much less. This model, with its appendages, was made to move with a proportionate degree of slowness, so that the action and reaction of the parts became obvious and intelligible.

A timekeeper may be divided into two parts:

1. The motive part,
2. The regulating part.

The first merely produces motion, the second regulates its velocity.

The motive part may be subdivided into

(1) The motive power, which is a weight or spring.

(2) The distributive power, which is a train of wheels increasing the velocity, and of course diminishing the intensity of the force arising from the descent of the weight, or the uncoiling of the spring.

The use of the train of wheels will be understood by considering that the weight or spring barrel of a thirty day clock, will not make, perhaps, more than ten revolutions, while the second's hand of the same clock will, in the same time, make fifty thousand revolutions. The train of wheels, therefore multiplies the insensible velocity generated by the weight or spring, till it becomes the visible velocity of the second's hand, which is placed on the axis of the last wheel of the train called the *escape wheel;* this wheel has, therefore, a constant tendency to move in obedience to the impulse communicated through the train from the weight or spring. This tendency to move is what keeps the clock going; but the motion requires to be regulated, and made perfectly uniform, which leads to a consideration of the other essential part of a timekeeper, the regulating part.

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* Jameson's Journal.

This may also be subdivided into two parts:

(1) The pendulum, or balance, which governs the rate.

(2) The escapement, which transmits that government to the train, and in return transmits the impulse of the train to the pendulum.

In order to understand properly the escapement, we must have some idea of the properties of the pendulum.

A body suspended so as to move without friction, and exposed to no resistance from the air or other causes, being made by equal impulses to perform equal vibrations, would perform them in equal times, even if we had no better proof of the fact than the old metaphysical argument, that there is no sufficient reason to the contrary. So also, though there be friction at the point of suspension, and air resisting the vibration, if that friction, and that resistance of the air, be quite invariable, the vibrations would continue invariable both in quantity and time, for the same want of a sufficient reason otherwise. In all this, however, we have assumed three impossible conditions.

In the first place, it is impossible always to give exactly equal impulses to the pendulum.

In the second, the friction is likely to vary from temperature, and from the changes which the oil, or other lubricating material undergoes.

In the third, the resistance of the air changes from temperature, moisture, and other circumstances.

These causes (with others) preclude the possibility of making a pendulum perform for any length of time exactly equal vibrations; and since the longer vibrations of a simply suspended pendulum occupy more time than the shorter ones, it becomes an incorrect measure of time. The error produced in this way is very slight, yet enough to be sensible in instruments so perfect as they are now made. The times occupied in describing a complete semi-circle, and the smallest sensible arc, differ only in proportion of 34 and 29; and the error becomes much less, in proportion as the differences between the arcs of vibration are less.

If, however, as it is well known, a pendulum could be made to vibrate, describing the arc called a cycloid, it would perform all its vibrations, whether long or short, in equal times; and it was, therefore, proposed by Huygens, to attach to the upper part of the pendulum an apparatus which should cause it to describe cycloidal arcs and thus to free it from the errors arising from changes in the arc of vibration. It was found, however, that this apparatus required an impracticable degree of accuracy in the workmanship; and therefore it was abandoned for the better plan of endeavouring to make the arcs of vibration as small and as equal as possible. This is the problem, which has for two centuries exercised the ingenuity of the first mathematicians and mechanics of the world, and the best solution of which it was Mr. Ainger's object to illustrate.

For the further details of this important subject, the reader is referred to *Brande's Journal,* No. 6.

IMPROVED CUTLER'S MILL.

Mr. Gill, in his *Technological Repository,* says, he lately saw a surgeon's instrument maker polishing lancet blades on a tool driven in a mill worked by himself with a considerable velocity; and thus completely avoiding the expense of having a turnwheel to pay as usual.

The mill was contained within and supported upon a wooden frame about 4 feet high, 3 feet wide, and 6 feet long; firmly braced to the floor and strengthened by iron bands, but it had been much better to have been mounted upon a firm cast-iron frame. Near the front end of the mill, a cast-iron band-wheel similar to that of a foot-lathe, of 3 feet in diameter, and with a heavy periphery or rim to it, but light arms, was mounted upon an axis, with a cylindrical neck or pivot at each end of it, and having a double crank formed upon it, the necks of which were placed in opposite directions to each other, and a hook was hung upon each neck, descending to two wooden treadles, turning at their back ends, upon a cylindrical rod passed across the frame, and having staples driven into the upper sides of them, into which other hooks, formed at the lower ends of the crank-hooks were passed; these treadles at their outer ends came within convenient reach of the feet of the workman, who was seated upon a bench laid across two sloping supports, projecting from the two front ends of the frame, and who could thus communicate *two impulses to the wheel at each revolution of it;* and also govern its motion so as to cause it to move quicker or slower at pleasure. In order still further to increase the velocity of his grinding, glazing, and polishing tools, a leather band was passed from the band-wheel around a small rigger or band-wheel about 5 inches in diameter, from which another leather strap or band was passed around the pulley which was affixed upon the right-hand end of the spindle of each grindstone, glazer, or polisher, and which pulleys varied in their diameters, according to the greater or lesser velocity with which the different tools required to be driven. The larger band-wheel was so placed as just to escape rubbing against the workman's knee, and the spindle carrying the different tools were mounted at the front end of the frame; and indeed the whole disposition of the parts was most judiciously contrived so as to save room in the workshop, and to perform their work in the most complete manner. The spindles upon which the grindstones, glazers, and polishers were hung, had sharp conical points at their ends as usual with cutlers, and ran in holes made in wooden adjusting blocks in the same manner as they are commonly employed; and the necks or pivots of the two other axes ran upon hard steel hollowed plates.

Besides rendering the workman at all times perfectly independent of the caprice or irregular attendance of his turn-wheel, the absence of whom frequently causes delay and much loss of time; the room saved in the workshop from the removal of the large band-wheel and its cumbrous frame, is a great advantage indeed. The workman stated, that the power required to drive his mill for grinding, glazing, and polishing small works in cutlery, such as lancets, and other delicate surgeons' instruments; instruments for operating upon the eye, penknives, &c. was very trifling; but that in grinding razors, or still larger instruments, it was considerable; in this case, however, he was able to avail himself of the occasional help of an assistant, who seated upon the bench behind him, could operate with his feet upon the outer end of the treadles, and thus render the labour comparatively light.

A water-trough was supported upon hooks resting upon the top rails of the frame, with a splash-board in it, secured by a wedge, as usual in grinding articles of cutlery.

We hope that similar mills to the above may now become more common than has hitherto been the case; and think that they may be applicable to a great variety of other purposes, than merely the grinding, glazing, and polishing of cutlery. Our description is, we believe, sufficient to enable any workman of competent skill to construct them.

SINGULAR CASE OF INVERTED VISION.

Dr. Goodman relates in the American Journal (of Medical Sciences?) an instance of a boy, seven years of age, to whom every object appeared inverted. The fact was cummunicated to Dr. Goodman by the uncle of the boy. "When his father, who was a distinguished artist, began to give him lessons in drawing, he was very much surprised to find that whatever object he attempted to delineate, he uniformly inverted; if ordered to make a drawing of a candle and candlestick set before him, he invariably drew it with the base represented in the air, and the flame downwards. If it was a chair or table he was set to copy, the same result was the consequence; the feet were represented in the air, and the upper part of the object, whatever it might be, was turned to the ground. His father, perplexed at what he considered the perverseness of the boy, threatened, and even did punish him for his supposed folly. When questioned on the subject, the youth stated that he drew the objects exactly as he saw them; and as his drawings were, in other respects, quite accurate, there was no reason to doubt his statement. Whenever the object was inverted previous to his drawing it, the drawing was made to represent it in its proper position, showing that the sensations he received from the eye were exactly correspondent with the inverted pictures formed upon the retina. This condition of his vision was observed to continue for more than a year, when his case gradually ceased to attract attention, which was when he was eight years old; since that time he has imperceptibly acquired the habit of seeing things in their actual position.

If this case be correctly described, it is unfortunate that the facts were not more closely examined, and their number multiplied. There is nothing extraordinary in the inverted position of the boy's drawing corresponding with the inverted figure of the object formed on the retina; the extraordinary fact is that, of the objects external to the eye, some seemed to the lad in the right position, and others inverted; for from the description it would appear, that the boy saw the upright object to be drawn, and the inverted drawing of it in the *same* position. Query, What would he have done, if he had been told to make a drawing of his drawing? that is to copy his own drawing. The only way in which the statement can be really true is, that the boy saw objects, erect or inverted, according as they were farther from or nearer to the eye. The inverted drawing should have been carried from the eye until by the side of the object, and then the effect on the lad compared; and if, in the course of that passage, it seemed to change its position so as to become inverted, as compared to the original object, then the distance at which the change seemed to take place would have been the spot for some interesting experiments.*

YOUTHFUL INGENUITY.

A YOUNG gentleman, a native of Elgin, lately printed several copies of an 18mo. work, extending to nearly 70 pages. He made the whole of the types with his own hand, and with the assistance of no other implement than a penknife. He also constructed the press with which the work was printed, and manufactured his own ink. What is perhaps as singular is, that he composed, corrected, and printed the whole impression with his own hand, without having received the slightest direction from any individual, or ever having seen a printing establishment, or any thing belonging to it.†

TUNNEL UNDER THE VISTULA.

A PROJECT has been formed for the construction of a tunnel under the Vistula; this mode of communication will be of the utmost utility, especially at the times of the breaking up of the frosts, when all intercourse is interrupted. The architect is a foreigner, and has engaged to complete the work in the space of three years.‡

LONDON UNIVERSITY ROOF.

As a proof of the different views of different architects with regard to the strength of materials, we cannot cite more forcible examples than those exhibited in the roof of the late Brunswick Theatre and that of the new London University. Though we have no wish to eulogize one architect at the expense of another, we believe scarcely any person, at all acquainted with the strength of building materials, would have considered the horizontal scantling of such an immense iron roof as that of the late theatre,

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* Brande's Journ. † Elgin Courier. ‡ Paris Paper.

117 feet by 63, sufficient to guarantee the perfect safety of the building; while the iron ties and girders, which connect the walls of the new University, are strong enough to sustain a roof of at least four times the estimated weight. The principle on which these horizontal girders are constructed, that of a rib, or rafter, with a pediment elevation, we think very beautiful; while every risk of fracture from sinking, or from the lateral pressure, is provided against by a wrought iron bolt (forming, as it were, the chord of the arc) running from end to end, and secured by nuts and flanges in the usual way.*

GREAT BELLS.

In China there have been made bells of most enormous weight. At Pekin there are seven bells, cast in the reign of Youlo, each of which weighs 120,000lbs. At Nankin, there is a bell which weighs full 50,000lbs. Few bells in Europe can be compared with either of these in point of weight. The great bell at Erfurt, in Upper Saxony, weighs about 25,400lbs.; it is said that the great bell at Rouen, in Normandy, weighs 35,000lbs., but even this is much inferior to the Chinese bells. Some authors assure us that the bells at Moscow are the largest in the world. The bell given by Boris Godenof to the cathedral of Moscow, weighed 288,000lbs.; but this is surpassed by the bell which was cast by order of the empress Anne, the weight of which was 430,000lbs., its height 19 feet; its circumference at the bottom 21 yards, and its greatest thickness 23 inches. After mentioning these, the weights of the great bells in England will appear very trifling. That at Oxford weighs 17,000lbs.; that at St. Paul's, London, 11,474lbs.; and the Great Tom of Lincoln (which cracked lately) only 10,854lbs.†

FRENCH BUILDING REGULATIONS.

The dreadful accident that occurred during the past year at the Brunswick Theatre, and the insecurity of the public, from the ignorance or negligence of individuals, calls imperiously for some legislative regulations similar to those adopted by the French government. In France, details of every part of the plan and construction of public buildings must be previously submitted to a government architect, who examines the whole carefully, and suggests the alterations and modifications which he judges necessary for the public safety: and it is only on his written approval of the plan that the construction is permitted to be executed. Nor does his charge end here; he superintends the works as they proceed, and prevents the slightest deviation from the plan as sanctioned by him. Had such a regulation existed in

* Verulam. † Mech. Mag.

England, the calamity at the Brunswick Theatre would not have happened.

The paternal care of the French government, in whatever concern the public safety and health, is admirable. In England, we hear continually of houses in a state of dilapidation, falling and entombing numerous persons in the ruins. In France there are regular inspectors who go systematically through Paris, to ascertain the state of the houses; and whenever the slightest appearance of danger is obvious, the tenants are ordered to quit, and the place is pulled down. Private interests are never consulted, when personal safety of the public is concerned. This *surveillance* is extended to the construction of all forges, furnaces, steam-engines, the manufactories of chemical products emitting offensive odours, &c. If a high pressure engine be permitted in a town, one of the conditions is, that it shall be surrounded by a wall 4 feet thick, and the chimney must rise to a certain height above the adjoining buildings. The engine is not even permitted to be wrought, unless the boiler has been previously proved capable of supporting a power of steam four times greater than that at which it is intended to work. Besides these precautions, every boiler must be provided with a metallic plate, fusible at a small degree above the working power, that in case the safety valve should not act, or any other dangerous circumstance arise whereby the steam would become of a greater force than intended, the plate may melt, and the steam escape in abundance by the orifice. A few months since a dyer, near Paris, who had a high-pressure engine, was interdicted working it on account of the insecurity of the boiler. The proprietor ordered another to be made, and invited the officers of government to witness the proof of it at the maker's; it was intended to work at two atmospheres, and perfectly resisted the force of eight atmospheres, and was consequently approved. The proprietor, however, thinking to be too cunning, did not send for it, but had his old boiler cut shorter and used again. The government engineers not suspecting the trick, did not examine the boiler when putting up. The engine had not been at work two hours, when the new end of the boiler was blown off at the rivets; the steam rushed out, and destroyed two houses in the rear; and the boiler itself was driven in a contrary direction, through the engine-house, to the distance of 60 yards; though weighing above 2 tons; it destroyed the engine, and killed the engineer and the proprietor, who happened to be in the engine-house. This accident arising from the wilful misconduct of the proprietor, his family was ordered to grant a pension to the widow of the engineer.*

EXTRAORDINARY NAIL MAKING.

James Leighton, a nail-smith, in the employ Mr. Thomas Gillies, ironmonger, in Stirling, lately undertook for a trifling bet to make 17,030 double flooring nails, 1,200 to a thousand of 20lbs. for two successive weeks, a task which must, to all who have any knowledge of this trade, seem scarcely credible. The workman finished his first week's task by three o'clock on Saturday afternoon; resumed his labour on Monday morning, and concluded his second week's task with even more ease than he did the first. Those who do not understand the nature of the work, may form some idea of the undertaking, when they are informed that the above quantity is allowed to be as much as three ordinary men can perform without difficulty, and that allowing 25 strokes of the hammer (which is 2lbs. weight) to each nail, including the cutting of the rods into a size convenient to be handled, and re-uniting them when too short; there were no less than 1,033,656 strokes required before the task could be completed. In addition to this, the workman had to give from one to three blasts with his bellows for every nail he made—had to supply the fire with fuel—and had to move from the fire-place to where the nails were made, and, *vice versa*, upwards of 42,836 times. The workman entered into his fifty-first year on the day on which he commenced his task; and had been upwards of 42 years a nailer; and in 1800, when in Ireland, in his majesty's service, beat one who was reckoned the best workman in that country, by 770 nails, during twelve hours' work.*

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* Literary Gazette.

PRESERVATION AGAINST RUST.

Lampadius states, that the following composition is an effectual preservative of iron from rust. One ounce of jet, ground to the finest powder; 4 ounces of vitriol of lead, and 1 ounce of white vitriol, mixed in a pound of linseed oil varnish, and stirred carefully over a slow fire, till the mixture attains a boiling state.

PATENT KNIFE SHARPENER.

(*See Engraving.*)

The engraving explains the construction of an elegant appendage to the table, for sharpening knives. It is the invention of Mr. W. Parkin, of the Strand; and consists of two horizontal rollers placed parallel to each other, one only of which is brought into view in the figure, although the axis of the second will be observed, as (owing to the perspective) under the edge of the knife, which is however *placed between the two rollers*, and being drawn two or three times betwixt them from heel to point, the knife is sharpened, as if rubbed against what is termed a steel. The rollers revolve freely upon their axis; and at uniform distances there are fixed narrow cylinders, or rings of steel, the edges of which are finely cut with file teeth, forming thereby circular files; the edges of these files overlap, or intersect, each other a little, so that when a knife is drawn between them it operates on both sides of the edge at once; and as the rollers turn round at the slightest impulse, the peripheries of the circular files get uniformly worn, and consequently will last a long time. In sharpening a knife well with a steel some expertness is requisite, but in this little apparatus none whatever is necessary; its utility is therefore unquestionable.*

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* Mechan. Mag.

STEELYARD.

A NEW steelyard has been invented in France, which is said to possess greater accuracy than the description of that machine hitherto in use. One of the improvements in the new invention is, the ease with which it can be verified. The divisions, which are marked on the long arm of the beam, begin from a zero point; that is, from a point at which the travelling weight places the machine in exact equilibrium, when no weight is attached to the short arm of the beam. This enables the most ignorant persons to judge at once of the correctness of its construction.

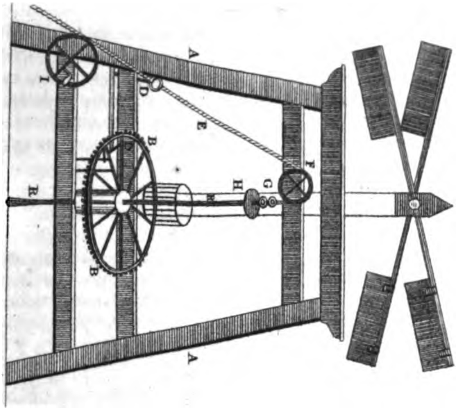
VAPOUR BATH.

A SIMPLE and convenient vapour bath may be formed of a common beer or spirit barrel, with a false bottom placed about a foot from the bottom of the cask, that is the end on which it is standing, and perforated with numerous small holes. A gun barrel, or tin tube, connected with the spout of a tea-kettle, placed on a fire, is to be introduced into an opening in the side of the cask, between the real and false bottom; and the patient being seated on the false bottom, the steam, or vapour, from the boiling kettle, soon surrounds him, by rising through the holes. It must be prevented from escaping by means of a blanket, which should cover the open end of the cask, and be applied closely round the neck of the patient.

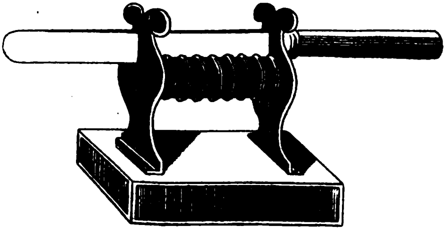
LOOMS IN THE UNITED KINGDOM.

THE estimated number of looms propelled by water and steam power, in the United Kingdom, is 58,000. The average produce, taking it at 22 square yards a-day, makes 1,254,000, or 1,741 yards a-minute; weekly, 7,524,000; monthly, 31,300,000; yearly, 376,200,000. Allowing 6 yards to each person for yearly consumption, will supply 62,700,000, and will cover 62,700 acres of ground; and in length would extend 213,750 miles, and reach across the Atlantic Ocean 71 times.†

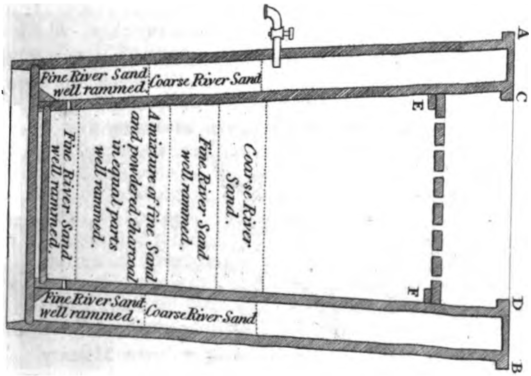
* Regist. of Arts. † Manchester Mercury.



Boring Machinery. p.46.



Knife Sharpener. p.43.


A
C
E
F
D
B
Fine River Sand well rammed.
Coarse River Sand
Coarse River Sand.
Fine River Sand well rammed.
A mixture of fine Sand and powderd charcoal in equal parts well rammed.
Fine River Sand well rammed.
Fine River Sand well rammed.
Coarse River Sand

French Filter. p. 8.

NEW BORING MACHINERY.

(See the Engraving.)

MR. DIXON VALLANCE suggests that "in many situations where that powerful agent, the wind, blows with a fair sweep, it might be advantageously employed for *boring the earth*." He then says, "I shall now give you an account of a *boring machine*, of which wind is to be the moving power. I would just premise, that in boring through hard stones, the auger must have a slow, rotary, and a quick striking motion, at the same time; that is, it should give ten, twelve, or fourteen strokes for each revolution, more or less, in proportion to the hardness of the stone; while in boring through softer substances, or cleaning the hole, the rotary motion only is used.

A A, in the figure, represents the frame of the machine; B B shows a horizontal wheel about three feet six inches diameter, with ten, twelve, or fourteen handspokes fixed in it; its axle or nave is one foot in length, and one foot diameter, and bound with a strong hoop of iron at each end; a cast iron bush passes through the axle of the wheel, and serves both for the wheel to turn round on, and for the boring rod to work up and down in. The boring rod R R is of an oblong square shape, two inches thick and three inches broad, where it works in the bush, and five or six feet long. G shows the bush. By turning round the wheel, the handspokes catch the crank D, which gives a striking motion to the rod. When boring through soft substances, or cleaning the hole, these spokes may be taken out. E E is a rope or chain to let down the rod as it works its way, four or five feet, when another length of rod is screwed to it, and so on, until the hole is deep enough. The rope or chain E is fixed to the crank D D, and passes over the pulley F, and is attached to the rod by a swivel at G, to prevent the chain from twisting. H is a weight fixed on the rod. I shows a crane for raising the rods. The arm of the crank next the wheel is perpendicular, and the arm that the chain is fixed to, horizontal. The arrows point the way the wheel turns.

The engraving represents a wind-wheel attached to drive the machine.*

PATENT AIR ENGINE.

WE have the pleasure to lay before our readers another, and we believe more successful attempt, to render available to useful purposes, the elastic force of air, in the construction of a new motive engine, than any previous arrangement for the same purpose. We have seen two models of these air engines at work, in which two distinct modifications of the patent apparatus are introduced. The operations of heating and cooling the air are performed so rapidly by them, as to cause 150 strokes of the piston in a single engine to be made per minute. This invention can only be illustrated by a series of diagrams not altogether calculated for a popular work like the present; but an accurate description of the machine will be found in No. 32, "Register of Arts." The patentees are Messrs. Parkinson and Crosley.

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* Mech. Mag.

The power of this engine is derived from the heating and cooling of air, in an air-tight vessel, which the patentees term a *differential vessel;* a portion of this vessel being exposed to heat, and another to cold, externally. Inside the differential vessel is placed another of a similar figure, called a *transferer;* this being moved from the hot to the cold parts of the differential vessel, and from the cold to the hot, alternately, transfers the air, and subjects it to the variations of temperature, as it passes along the internal surface of the differential vessel; and thus, by the expansion and contraction of the air, produces force for giving motion to machinery. The patentees do not claim to be the discoverers of obtaining power, by the alternate contraction and expansion of the air, by the process of heating and cooling, but in the peculiarity of their method of effecting it.

POLISHING IRON, BRASS, &C.

Mr. Ford, the engineer, produces a beautiful surface upon his cast-iron, steel, and brass works, by means of emery sticks, and others coated with crocus; and which he prepares in the following superior manner:—

He usually mixes drying linseed oil, in the proportion of one-eighth part with his glue, and with this he coats the surfaces of pieces of soft yellow pine, fir, or deal, without turpentine or knots, which are about eight inches long, and five-eighths of an inch square, and are nicely planed smooth. He first lays on a coat of thin glue, and when that is dry, another composed of glue mixed with the emery or crocus, and then instantly sifts over the wet surface the emery or crocus in powder, by means of a sieve. He employs emery of different degrees of fineness, and has sticks thus coated with each, to be used in succession, to smoothen the work; and lastly, uses those coated with glue and crocus, to give the finishing polish to it.

These emery and crocus sticks are very durable, and are equally useful to be employed on works in the lathe, as well as upon flat surfaces, and are greatly superior to the glass or emery papers ordinarily used; and infinitely so to the employment of emery mixed with oil, and applied upon sticks in the common way of doing it. He usually removes the angles for about three inches at one end of the stick to round it and make it serve as a handle to hold it by; and coats the other five inches only with the emery or crocus. He also when they are become quite dry, as at the end of nine or ten days time, rubs them over with sweet oil. He also occasionally uses oil with them in smoothing his work, in the same manner as in using smooth files. He also sometimes makes the pieces of wood broader than as above stated for particular purposes.*

* Technological Repository.

DISTANCES AT WHICH SOUNDS ARE HEARD.

I RECOLLECT being, many years ago, at the west end of Dumferline, and hearing part of a sermon then delivering at a tent at Cairninghill. I did not miss a word, although the distance must be something about two miles. It was the late Dr. Black, of Dumferline, who preached, and who perhaps has seldom been surpassed for distinct speaking and a clear voice. The sound was such as I should have expected in favourable circumstances at a quarter of a mile. The wind, which was steady, but moderate, came in the direction of the sound. I was riding westward, and at length saw the doctor finishing his sermon, otherwise I should have doubted whether he had been at such a distance. Whether the sound had run along the road as in a tube, I cannot say. I recollect little of what sort of road it is; part I think has pretty good dykes which might guide and confine the sound, aided by the wind.*

LIQUORICE PAPER.

ACCORDING to the French papers, M. Julia Fontenelle has established a manufacture of paper from liquorice root. It is said to be very white, to require no sizing, and to be manufactured at a price much less than that made from rags.

ORNAMENTING WOOD IN THE LATHE.

MANY years since, Mr. Gill was instructed in a method of ornamenting white wood in the lathe, and which he has never seen described in any of the numerous works published on the arts.

The method consists in forming a composition of shellac and resin, to which various coloured powders are added, whilst the composition is in the melted state; such, for instance, as red-lead, vermilion, Prussian blue, indigo, king's yellow, yellow ochre, lamp-black, &c.; each colour being formed into a separate mass or ball, to be used in the following manner:—

When the wood is turned into shape, and running swiftly round in the lathe, a ball of the desired colour is held against it, in the place desired to be coloured; the heat produced by the friction quickly melts a portion of the coloured mass, which adheres to the wood, and is then to be spread and diffused over its surface, and polished by means of a piece of cork held against it. The edges of the coloured rings are then brought into an accurately defined shape by means of the turning tool; and then another colour may be applied to the wood in a similar manner, and so on, until the designed effect is produced.

We have frequently seen colours applied in a coarse manner to wood in the lathe; these are, however, mixed in a softer composition, of which bees'-wax forms the chief part, and are by no means capable of being applied in the delicate manner above mentioned. Tunbridge ware may, no doubt, be thus ornamented in the lathe with considerable advantage.*

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* Jameson's Journal.

CUTTING DIAMONDS.

We cut the diamond at the present time in two different manners; viz. into the rose and the brilliant. The rose diamond is flat underneath, like the softer stones, but its upper surface is raised in the form of a dome, and cut into facets. It has commonly six facets in the centre, which are in the shape of triangles, united at their summits; their bases abut upon another range of triangles, which are posited in the reversed order to the preceding ones, and their bases are applied against, or in contact with, them; their points forming what are termed *feuilletes* or leaves. These last triangles have between them spaces, each of which is finally cut into two facets. By this arrangement the rose diamond is cut into twenty-four facets; and the surface of the stone is divided into two parts, of which the uppermost is termed the crown, and the surrounding part below it the teeth.

The brilliant is always thinner than the rose diamond. Its thickness is divided into two unequal parts; one-third is reserved for the upper face of the stone, and two-thirds remain to form the lower part of it, which is termed the *culasse*. The table has eight panes; the circumference of it is cut into facets, of which some are triangles, and the others lozenges. The culasse is also cut into facets, which are termed *pavillons*. It is important that these pavillons should be placed in the same order as the upper facets; and that they should agree with each other in the most perfect symmetry, lest they should produce a false play of light.

Although the rose diamond darts a great splendour of light, in proportion as it is more spread than the brilliant; this infinite advantage is caused by the difference in cutting it. It is formed into thirty-two facets, of different figures, and inclined at different angles, all round the table, upon the upper face of the stone. The culasse is cut into twenty-four facets, around a small table, which converts the culasse into a truncated pyramid. These twenty-four facets below, as well as the thirty-two above, are differently inclined, and exhibit different figures. It is however, essential, that the facets of the upper and lower parts correspond with each other, and that their proportions be so exact, as to multiply their reflections and refractions, and so that we shall best perceive the colours of the solar spectrum.

The other natural precious stones, as well as the artificial ones or paste, are cut in the manner of brilliants; the only difference consists in the materials employed in forming the mills they are cut and polished upon; and in the substances which serve to cut and polish them.†

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* Technological Repository. † Ibid.

LENSES FOR SINGLE MICROSCOPES.

An ingenious artist, by name Pritchard, having succeeded in producing a small diamond lens for a single microscope, and its incontestible superiority being manifest, has induced him to apply himself to the formation of sapphire lenses for the same purpose; experiment having proved that after the diamond, it possesses a stronger refraction than any other substance, capable of giving a single image, while its dispersive power is very low. The faint blue tinge of the sapphire is not felt in thin small lenses formed of this substance, which thus comes next in order to diamond ones, and forms an excellent substitute for the use of those persons unable to afford the expense of the latter.*

ZINC ROOFS.

Roofs covered with malleable zinc are very numerous in the Low Countries, but have one bad quality which is against them. In cases of fire, the zinc being very combustible, causes the dispersion of inflamed portions of the metal, which falling all around, occasion great danger to those who approach the building.†

RECENT IMPROVEMENTS IN THE ART OF PRINTING.‡

It is a remarkable fact, that from the invention of the art of printing, to the year 1798, a period of nearly 350 years, no improvement had been introduced in this important art. In Dr. Dibdin's interesting account of printing, in the "Bibliographical Decameron," may be seen representations of the early printing presses, which exactly resemble the wooden presses in use at the present day.—The immense superiority of the press over the pen induced, perhaps, a general belief that nothing more was possible, or it might be that the powers of the press were quite equal to the demand for its productions.

A new era has, however, arisen, the prompt and extensive circulation of the public journals and other periodicals requiring powers which the ordinary press could never reach.

The first important improvement of the common press was the invention of the late Lord Stanhope. This press is composed entirely of iron; the table on which the types rest, and the platten, (or surface which gives the impression,) are made perfectly level: he has thus introduced better materials and better workmanship, to which, however, he added a beautiful combination of levers, to give motion to the screw, causing the platten to descend with decreasing rapidity, and consequently with increasing force, till it reaches the type, when a very great power is obtained. There have been, perhaps, twenty contrivances for obtaining the same effect; but as a *press*, Lord Stanhope's invention has not been surpassed. Still it is only a press, and in point of *expedition* has little superiority over its wooden rival, producing 250 impressions per hour.

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* Monthly Mag. † Journal Polytechnique.

‡ Communicated to *Brande's Journal* by Mr. Cowper.

Lord Stanhope was also the successful reviver of the art of stereotype founding, the process of which is as follows:—a brass frame is placed round the form of types; Plaster of Paris, mixed with water to the consistence of cream, is then poured on the type, the superfluous plaster being scraped off. When the plaster is hard, the mould is lifted off by means of the brass frame, and from which it is readily detached—it is now baked in an oven, and when well dried and quite hot, it is placed in an iron box or casting-pot, which has also been heated in the oven; it is now plunged into a large pot of melted type-metal, and kept about ten minutes under the surface, in order that the weight of the metal may force it into all the finest parts of the letters, the whole is then cooled, the mould broken and washed off, and the back of the plate turned in a lathe. This manufacture has been carried to a considerable extent; Mr. Clowes, the proprietor of one of the largest and best conducted printing-offices in London, has on his premises between 700 and 800 tons of stereotype plates, belonging to various booksellers, the value may be estimated at £200,000.

In connexion with the Stanhope press, may be briefly noticed a little improvement for the particular purpose of printing music, after a new process, and for which I have obtained a patent.—In this new process the lines are formed of thin slips of copper driven into small blocks of wood, and the notes are formed of copper driven into a separate block. Two note blocks and two corresponding sets of lines are placed on the table of the Stanhope press; to the ordinary tympan of the press is attached another tympan, which revolves in the direction of its plane on a pin in the ordinary tympan. Two sheets of paper are placed under two friskets, hinged to the revolving tympan; an impression being now taken, one sheet will receive the notes, and the other the lines. The revolving tympan is then turned half round, when the sheets will have changed places, another impression is taken, when both sheets will be perfected. This plan is now in operation at the printing-office of Mr. Clowes, to whom I have assigned the exclusive use of the patent.

It was in the year 1790, that Mr. W. Nicholson took out a patent for certain improvements in printing, and on reading his specification, every one must be struck with the extent of his ideas on this subject; to him belongs, beyond doubt, the honour of the first *suggestion* of printing by means of cylinders.

The first *working* printing machine was the invention of Mr. Koenig, a native of Saxony. He submitted his plans to Mr. T. Bensley, the celebrated printer, and to Mr. R. Taylor, the scientific editor of the "Philosophical Magazine." These gentlemen liberally encouraged his exertions; and in 1811 he took out a patent for improvements in the common press, which, however, produced no favourable result; he then turned his attention to the use of a cylinder, in order to obtain the impression, and two machines were erected for printing the "Times" newspaper, the reader of which was told on the 28th of November, 1814, that he held in his hand a newspaper printed by machinery, and by the power of steam.

In these machines the type was made to pass under the cylinder, on which was wrapped the sheet of paper, the paper being firmly held to the cylinder by means of tapes; the ink was placed in a cylindrical box, from which it was forced by means of a powerful screw depressing a tightly-fitted piston; thence it fell between two iron rollers; below these were placed a number of other rollers, two of which had, in addition to their rotatory motion, an end motion, i. e. a motion in the direction of their length; the whole system of rollers terminated in two which applied the ink to the types.

In order to obtain a great number of impressions from the same form, a paper cylinder (i. e. the cylinder on which the paper is wrapped) was placed on each side the inking apparatus, the form passing under both. This machine produced 1,100 impressions per hour; subsequent improvements raised them to 1,800 per hour.

The next step was the invention of a machine, (also by Mr. Koenig,) for printing both sides of the sheet. It resembled two single machines placed with their cylinders towards each other, at the distance of two or three feet,—the sheet was conveyed from one paper cylinder to the other by means of tapes—the track of the sheet exactly resembled the letter S, if laid horizontally, thus ∽: in the course of this track the sheet was turned over. At the first paper cylinder it received the impression from the first form, and at the second paper cylinder it received the impression from the second form—the machine printed 750 sheets on both sides per hour. This machine was erected for Mr. T. Bensley, and was the only one Mr. Koenig made for printing on both sides the sheet—this was in 1815.

About this time Messrs. Donkin and Bacon were also contriving a printing machine; having, in 1813, obtained a patent for a machine in which the types were placed on a revolving prism—the ink was applied by a roller which rose and fell with the irregularities of the prism, and the sheet was wrapped on another prism, so formed as to meet the irregularities of the type prism: one of these machines was erected for the University of Cambridge, and was a beautiful specimen of ingenuity and workmanship; it was, however, too complicated, and in inking was defective, which prevented its success. Nevertheless a great point was attained; for in this machine were first introduced inking rollers covered with a composition of treacle and glue; in Koenig's machine the rollers were covered with leather, which never answered the purpose well.

In 1815 I obtained a patent for curving stereotype plates, for the purpose of fixing them on a cylinder. Several of these machines, capable of printing 1,000 sheets per hour on both sides, are at work at the present day, and twelve machines on this principle were made for the Bank of England a short time previous to the issue of gold.

It is curious to observe that the same object seems to have occupied the attention of Nicholson, Donkin and Bacon, and myself, viz. the revolution of the form of types. Nicholson sought to do this by a new kind of type, shaped like the stones of an arch.—Donkin and Bacon sought to do this by fixing types on a revolving prism, and at last it was completely effected by curving a stereotype plate.

In these machines two paper cylinders are placed side by side, and against each of them is placed a cylinder for holding the plates; each of these four cylinders is about two feet diameter,—on the surface of the plate cylinder are placed four or five inking rollers, about three inches diameter; they are kept in their position by a frame at each end of the plate cylinder, the spindles of the rollers lying in notches in the frame, thus allowing perfect freedom of motion and requiring no adjustment.

The frame which supports the inking rollers, called the waving-frame, is attached by hinges to the general frame of the machine; and the edge of the plate cylinder is indented, and rubs against the waving-frame, causing it to wave, or vibrate to and fro, and, consequently, to carry the inking rollers with it, thus giving them a motion in the direction of their length, called the end motion.—These rollers distribute the ink upon the three-fourths of the surface of the plate cylinder, the other quarter being occupied by the curved stereotype plates. The ink is held in a trough; it stands parallel to the plate cylinder, and is formed by a metal roller, revolving against the edge of a plate of iron; in its revolution, it becomes covered with a thin-film of ink; this is conveyed to the plate cylinder, by an inking roller vibrating between both. On the plate cylinder, the ink becomes distributed, as before described, and as the plates pass under the inking rollers, they become charged with colour; as the cylinder continues to revolve, the plates come in contact with a sheet of paper in the first paper cylinder, whence it is carried by means of tapes to the second paper cylinder, where it receives an impression on its opposite side, from the plates on the second plate cylinder, and thus the sheet is perfected.

These machines are only applicable to stereotype plates, but they formed the foundation of the future success of our printing-machinery, by showing the best method of furnishing, distributing, and applying the ink.

In order to apply this method to a machine capable of printing from type, it was only necessary to do the same thing in an extended flat surface, or table, which had been done on an extended cylindrical surface; accordingly, I constructed a machine for printing both sides of the sheet from type, securing, by patent, the inking apparatus, and the mode of conveying the sheet from one paper cylinder to the other by means of drums and tapes.

My friend, Mr. A. Applegath, was a joint proprietor with me in these patents, and he also obtained patents for several improvements. I had given the end motion to the distributing rollers, by moving the frame to and fro in which they were placed. Mr. Applegath suggested the placing these rollers in a diagonal position across the table, thereby producing their end motion in a simpler manner. Another contrivance of Mr. Applegath's was to place half of my inking apparatus on one side the printing cylinder, and half on the other side, in order that one half the form might be inked on one side, and one half on the other, and so have a less distance to travel.

Another contrivance of Mr. A. was a method of applying two feeders to the same printing cylinder; these latter inventions are more adapted to newspaper than to book printing.

We have constructed upwards of sixty machines upon our combined patents, modified in twenty-five different ways, for the various purposes of printing books, bank notes, newspapers, &c. They have, in fact, superseded Mr. Koenig's machines, in the office of Mr. Bensley, (who was the principal proprietor of Koenig's patent,) and also in the office of the "Times," as was lately announced in that journal.

It may not be uninteresting to state that no less than forty wheels were removed from Mr. Koenig's machine, when Mr. Bensley requested us to apply our improvements.

Having, on the first trial of our machines, discovered the superiority of the inking roller and table over the common balls, we immediately applied them to the common press, and with complete success; the invention, however, was immediately infringed throughout the kingdom, and copied in France, Germany, and America; and it would have been as fruitless to have attempted to stop the infringement of the patent as it was found in the case of the Kaleidoscope.

This invention has raised the quality of printing generally,—in almost any old book will be perceived groups of words very dark, and other groups very light; these are technically called "monks and friars," which have been "reformed altogether."

The principal object in a newspaper machine is to obtain a great number of impressions from the *same* form, or one side of the sheet, and not from *two* forms, or both sides of the sheet, as in books.

In the "Times" machine, which was planned by Mr. Applegath, upon our joint inventions, the form passes under four printing cylinders, which are fed with sheets of paper by four lads, and after the sheets are printed, they pass into the hands of four other lads; by this contrivance 4,000 sheets per hour are printed on one side.

Machines upon our joint patents are also used for printing the

Morning Chronicle,
St. James's Chronicle,
Morning Herald,
Whitehall Evening Post,
Examiner,
Sunday Times,
Bell's Messenger,
John Bull,
Standard,
Atlas,
Sphynx,
&c. &c.

The comparative produce of the above machines is as follows:

Stanhope Press	250 impressions per hour.
Koenig's Machine	1,800 *i. e.* 900 on both sides.
Cowper's (stereotype)	2,400 *i. e.* 1,200 ditto.
Applegath and Cowper's (book)	2,000 *i. e.* 1,000 ditto.
Ditto (newspaper) Chronicle	2,000
Herald	2,400
Times	4,000—66 per minute.

A variety of machines have been invented by other persons, which have not been attended with sufficient success to make me acquainted with their merits, with the exception of Mr. Napier, who has erected several machines for newspapers.

Although the success of the inventions in which I have been engaged has rendered frequent reference to them unavoidable, I trust I have distinctly assigned to Mr. Koenig the honour of making the first working machine, and to Mr. W. Nicholson the honour of suggesting its principles, and that I have thus fairly stated the origin, the progress, and the success of the recent improvements in the art of printing.

METHOD OF OBTAINING THE FIGURE OF A PLANT.

A PIECE of paper is to be rubbed over with powdered dragon's blood, in the manner practised by engravers, and then the small branch or leaf of which the design is required, is to be laid upon it; by means of slight friction it soon takes up a small quantity of the powder, and being then laid upon moistened paper, an impression is to be taken in the manner practised for lithography without a machine. This process may be usefully employed for preserving certain physiognomical and characteristic features which cannot be retained by drying the plant.*

SOUNDING BOARD.

THE church of Attercliffe, near Sheffield, had long been remarkable for the difficulty and the indistinctness with which the voice from the pulpit was heard; these defects have been completely remedied by the erection of a concave sounding board, having the form resulting from half a revolution of one branch of a parabola on its axis. It is made of pine-wood; its axis is inclined forwards to the plane of the floor at an angle of about 10 or 15°; it is elevated, so that the speaker's mouth may be in the focus; and a small curvilinear portion is removed on each side from beneath, so that the view of the preacher from the side galleries may not be intercepted. A curtain is suspended from the lower edge, for about eighteen inches on each side. The effect of this sounding board has been to increase the volume of the sound to nearly five times what it was before; so that the voice is now audible, with perfect distinctness, even in the remotest part of the church; and more especially in those places, however distant they may be, which are situated in the prolongation of the axis of the paraboloid. But the side galleries are also benefited, probably from the increase of the secondary vibrations excited in a lateral direction. Several experiments are related illustrative of these effects; among which the most striking was one in which a person placed so as to have one ear in the focus of the paraboloid, and the other towards a person speaking from the remote end of the church, heard the voice in a direction the reverse of that from which it really proceeded. The superior distinctness of sounds proceeding from the focus, is accounted for by their all arriving at the same moment of time, at a plane perpendicular to the axis, after reflection from the surface of the paraboloid; which is a consequence of the equality of the paths which they have described.*

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* Bull. Univ.

ASSAMESE METHOD OF BLASTING ROCKS.

The Assamese close the mouth of the hole by driving in with a mallet a stout wooden plug some inches in length, through which a touchhole is bored. Between the powder and the lower part of the plug an interval of several inches is left; the communication is perfected by means of a tin tube filled with powder, and passed through the centre of the plug.†

MOTION PRODUCED BY THE CONTACT OF DIFFERENT SUBSTANCES.

The following fact is one published as having been described by M. B. Prevost, in 1814:—If a very small drop of oil be placed upon a large drop of mercury, it produces a greater or smaller extension in the latter. This phenomenon, with other similar ones, is attributed to a combination of the oil with the mercury, which produces a compound, the molecular attraction of which is less strong than that of pure mercury.‡

* Philosophical Mag. † Monthly Mag. ‡ Bull. Univ.

VELOCITY OF INTENSE AND FEEBLE SOUNDS.

In some interesting remarks upon sound in the seventh number of the "Edinburgh New Philosophical Journal," Mr. Meikle has called in question the truth of the received doctrine, that all sounds (whether loud or faint) move with the same velocity. Although this is true in ordinary circumstances when the sounds have not much intensity, (as when we listen to distant music,) yet it may cease to be true with regard to the intense report of a cannon. Indeed, as Mr. M. well observes, theory would lead us to suppose that the enormous quantity of heat which accompanies the explosion would increase the elasticity of the air, and the velocity of the sound, much more than in the case of sounds created by simple percussion.

It is true that in this part of the world no such difference has been observed, which may either arise from the comparison never having been carefully made, or from the difference of velocity being really inappreciable. In the frozen climates of the north, however, such a difference, if it exists, may be expected to manifest itself; for in an atmosphere perhaps a hundred degrees of Farenheit colder than that in which European experiments have been made, the heat at the mouth of the cannon is (relatively to the temperature of the air) very greatly increased. Such I think is the conclusion of theory, and such is also *the fact*, as appears from the following decisive observation, for which science is indebted to the Rev. George Fisher, the astronomer in Captain Parry's Northern Expeditions. I shall give it in his own words.* "The experiments on the 9th of February, 1822, were attended with a singular circumstance, which was—the officer's word of command 'fire' was *several times* distinctly heard both by Captain Parry and myself, about one beat of the chronometer (nearly half a second) *after* the report of the gun; from which it would appear that the velocity of sound depended, in some measure, upon its intensity. The word 'fire' was never heard during any of the other experiments. Upon this occasion the night was calm and clear, the thermometer 25° below zero, the barometer 28.84 inches, *which was lower than it had ever been observed before at Winter Island.*"

This last circumstance was probably not accidental; and if it is possible in our climate to distinguish the velocity of the sound of a bell from that of a cannon, it is at a time of diminished elasticity of the atmosphere, indicated by a low state of the barometer, that the attempt is most likely to succeed.†

THEORY OF THE SPINNING TOP.

The reason why a spinning top stands, is thus explained by Dr. Arnott, in his valuable *Elements of Physics*:—While the top is perfectly upright, its point, being directly under its centre, supports it steadily, and although turning so rapidly, has no tendency to move from the place; but if the top incline at all, the side of the peg, instead of the very point, comes in contact with the floor, and the peg then becomes a little wheel or roller, advancing quickly, and, with its touching edge, describing a curve somewhat as a skaiter does, until it become directly under the body of the top as before. It thus appears that the very fact of the top inclining, causes the point to shift its place, and so that it cannot rest until it come again directly under the centre of the top. It is remarkable, that even in philosophical treatises of authority the standing of a top is still vaguely attributed to *centrifugal force.* Hence some persons believe, that a top spinning in a weighing scale would be found lighter than when at rest; and many most erroneously hold that the centrifugal force of the whirling, which of course acts directly away from the axis, and quite equally in all directions; yet when the top inclines, becomes greater upwards than downwards, so as to counteract the gravity of the top. The way in which centrifugal force really helps to maintain the spinning of a top is, that when the body inclines or begins to fall in one direction, the motion in that direction continues until the point describing its curve has forced itself under the body again.

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* App. to Captain Parry's Second Voyage.

† Brande's Journal.

By reason of centrifugal force also, it is easier to do feats of horsemanship in a small ring, as at our theatres, than if the animal were running on a straight road. We see the man and horse always inclining inwards, to counteract centrifugal force, and if the rider tend to fall inwards, he has merely to quicken the pace, if to fall outwards, he has to slacken it, and all is right again.

ACHROMATIC TELESCOPES.

During the latter part of the last century, the manufacture of achromatic telescopes, which our countryman Dolland had brought to such perfection, was confined exclusively to this country; and although a limited, it was a lucrative branch of our export trade, while it extended the scientific character of the nation. Fettered, however, by the operation of the excise laws, the English experimentalists have been unable to make the practical researches required for producing flint-glass of the necessary purity in sufficient quantities, or rather with a sufficient extent of surface, to surpass in size the instruments made fifty years ago; and, on the continent, these researches have been prosecuted with success, so that our trade and our reputation, in this branch of art, seem gone for ever. The magnificent instrument at Dorpat, made by Fraunhofer, is well known. M. Lerebours, of Paris, has now executed, from some of Guinand's glass, an achromatic telescope, with an aperture of twenty-four inches, and a focal length of twenty-five feet; and there are at present for sale, in the French capital, three object glasses, of six inches aperture, and six feet focal length—of seven inches aperture, and seven feet focal length—and 10.4 inches aperture, and seventeen feet focal length. As a set-off against these, and the power of constructing similar instruments, the English must place the discovery of Mr. Barlow; we are happy to have it in our power to announce the success of this gentleman in the construction of telescopes with a correcting fluid medium; and from his well-known zeal in the cause of science, we hope that he will not suffer the effect of his valuable labours to be neutralized by the proverbial cupidity of the English opticians.*

ANEMOSCOPE

For ascertaining the Direction of Slight Winds. By Mr. B. M. Foster.

This instrument consists of an octangular box, with a circular opening in each of the sides. Within the box pieces of blotting-paper are fastened, which cover the openings. On the top of the box is a tin tube or socket, having a cork, with a ring by which it may be suspended in the air from a tree. If preferred, the cork may be taken out, and the box may be placed in an inverted position on a pole, the upper end of which goes into the tin tube.

The method of using this instrument is to wet equally all the portions of blotting paper which appear through the holes, and then place the instrument in its proper position. When it has been exposed a short time to the air, we must observe which portion of blotting-paper has dried most. "Thin slabs of slate or of stone, which easily give out moisture," says Mr. Forster, "would be far preferable to using blotting-paper. This instrument is founded on the principle by which I have understood sailors ascertain the course of the air in a calm, which is, by wetting a finger, and holding it up in the air; then, by feeling which part becomes by evaporation cool, they judge from whence the current of air flows. It is obvious that when the sun shines erroneous conclusions may be made without due attention."—*London Journal of Arts.*

⁂ This instrument would be greatly improved if a thermometer, which registered the lowest descent of the mercury, and having its bulb covered with wetted paper, were placed in each of the openings. By examining the state of the thermometer after a given time, we would be enabled to determine what had been the state of the winds during that time. In this way we would obtain, in the absence of the observer, a record of veering or changing winds, and would gather much information respecting what took place during a certain period. It would be easy to keep the bulbs of all the thermometers constantly wet. A greater number too might be used, and they might be so placed that one of them would not be affected by a wind blowing at any given inclination to the direction of the face on which it is placed.*

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* Monthly Magazine.

SWISS METHOD OF BLUEING IRON AND STEEL.

IRON and steel articles, when their surfaces are polished, whether simply by the file or by rubbing with emery, putty of tin, &c. are susceptible of receiving a blue colour from the action of heat, and which is rendered more beautiful or deeper, in proportion as the surface is more perfectly polished, or the operation more perfectly performed.

The following method appears to us to be the most advantageous, and we have seen it practised by the workmen in Geneva, and other parts of Switzerland, who excel in this art; it has also been successfully employed by many workmen in Paris. In a kind of stove made of sheet-iron, they place turfs, made of spent tanner's bark, or merely dried tan; these are covered with lighted charcoal-dust. The fire soon communicates to the turfs, or tan-dust; when these begin to burn, they place the pieces intended to be blued upon them, taking care that the ashes do not cover them, in order that they may see the colour which they assume. It is requisite to be very careful that the heat be uniform, and that it be retained at exactly the same degree, without being too great; as, in that case, the operation would fail entirely, and the blue colour soon disappear, and turn to a gray; the article would also lose its hardness, it must be hardened afresh, and there would be a very great chance of its being over-heated. In order to avoid these inconveniences, we should prefer a fire less active, and operate by degrees. When the well-polished steel has acquired a red colour, and it is seen that this colour is not perfectly uniform, the greatest heat must be directed towards the part where the colour is least intense, by blowing with the mouth that part of the fire adjacent to it. By this means, and with great care and patience, a beautifully uniform and deep-blue colour is obtained.

When the article has become of a red colour, if it is found to be clouded with various shades, it is better to suspend the operation, and polish the article afresh, either with emery, tripoli, *crocus martis*, putty of tin, &c. and entirely to begin anew, rather than expose the article to too great softening. We can only here point out general rules; there exists in every art a kind of dexterity which practice alone can give.

When the article has acquired the desired colour, it is withdrawn from the fire, and allowed to cool slowly, when it must be wiped with a clean, dry, linen cloth. Particular care is required not to touch the articles when finished with greasy or damp fingers; but above all, not to dip them in oil, as they would become dull, and lose that lustre in which consists all their beauty. This blue colour remains for a long time; nevertheless it is subject to change; in which case it may be restored to all its freshness, by the article being polished anew, and again submitted to the same operation.

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* Brewster's Jour.

Iron never takes so fine a blue as steel, as it does not receive so good a polish, neither is it so hard; and it is probable that the carbon contained in the steel has some influence on this operation.*

THE GREAT WESTERN CANAL

AFFORDS a continuous and uninterrupted navigation from the Hudson to Lake Erie, and communicates also, by means of a lateral branch, with Lake Ontario at Oswego. This canal is 363 miles in length; the difference of level between Lake Erie and the Hudson is 564 feet; but the canal may be considered as divided into two great but unequal sections, one deriving its waters from Lake Erie, the other from a summit level in the vicinity of Utica. Lake Erie is made use of as a principal feeder from the mouth of the canal as far as Montezuma, on Lake Cayuga, a distance of 67½ miles. The descent is 190 feet, by means of 21 locks. Beyond this point the canal rises 62 feet by means of 7 locks to the summit level; this extends for a distance of 69 miles of level and uninterrupted navigation. The descent to the Hudson is by 53 locks, 20 of which lie within the space of a few miles in the vicinity of the Cohos, or Great Falls of the Mohawk near its junction with the Hudson. Besides the lesser aqueducts and culverts by which this canal is carried over smaller streams, it crosses the Genesse River by an aqueduct of 9 arches of 50 feet span, and the Mohawk twice by aqueducts of 748 and 1,188 feet in length respectively.

The cost of this great work, up to the time it was opened for navigation, was nearly nine millions of dollars; seven millions and a half of which were raised by a loan, for the payment of the principal and interest of which, the faith of the state was pledged, along with the receipt of several branches of revenue. These produce about ten per cent. upon the amount borrowed, and hence ensure the liquidation of the debt within a period by no means remote. Thus, then, had the tolls on the canal been barely sufficient to keep it in repair, the construction of it was entirely within the reach of the ordinary resources of the state. But at the moment of its completion the revenue derived from the tolls became so productive, as to show conclusively that the bare pledge of them would have sufficed, both to pay the interest and extinguish the debt. The income for the year 1826, the first after the navigation was opened from the river to the lake, amounted to 800,000 dollars; for the year ending 1st of January, 1828, it will not fall short of a million. Hitherto, however, the immense receipts have, in a great measure, been absorbed by the canal itself, which can hardly be said to be finished even at the present moment. In the anxiety to reap the advantages its navigation promised, the work was pressed hastily, and, perhaps, prematurely to its conclusion. Hence much was unfinished—much required alteration and repair. The expenditure, however, of the last two years has gone far towards making the canal complete, and in a very short space of time it will be supported at an expense no greater than attends the repairs and care of other similar works. The debt will then rapidly diminish, and it may be confidently anticipated that within ten years the state of New York will possess, free from incumbrance, a source of revenue more than four times as great as the largest amount of direct and indirect tax that has ever been levied.*

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* Dictionnaire Technologique.

IMPROVEMENT IN TURNING LATHES.

Mr. Tyler, of Philadelphia, has directed the attention of mechanics to the important fact, that *cast-iron* is superior as a collar to the hard steel mandrel of a lathe, to the hard steel collars usually employed; it also diminishes the labour of making it, and affords a solid, in place of an inserted, collar; besides which, the lathe is found, by experience, *to run a much longer time without requiring to be fresh oiled,* than when the steel collar was used.

Mr. Tyler has also mounted his lathe upon a cast-iron stand, instead of upon the table and nests of drawers, holes being made in the frame for the pivots of the treadle and the crank-axle to turn in; the lathe is thus better adapted to the usual run of work than when fitted up in the originally expensive manner.†

WATER-WHEELS FOR SHIPS.

Dr. Arnott, in his *Elements of Physics,* shows of what importance to navigation it might be to have, as a part of a ship's ordinary equipment, one or two water-wheels, to be affixed upon the ship's side when required, like the paddle-wheels of a steam-boat, and by turning which the crew might easily deliver themselves from the tedium, and often disastrous consequences of a long calm at sea. This idea occurred to the author while in a ship completely becalmed for weeks on the Line; during which most wearisome period, the breezes were often seen roughening the water a mile or two farther on; and any means that could have enabled the ship's company to advance her that little distance, might have saved the delay. The wheels might be driven by connexion with the capstan, which, under such circumstances, the crew would most willingly turn to escape from their inactivity. Delay in large vessels with troops on board often costs hundreds of pounds per day, and may retard the execution of important projects. But the propelling of the ship in a calm seems by no means the most important purpose which such wheels might serve. If from disease, fatigue, or other cause, the crew were inadequate to existing necessities, two wheels affixed to the extremities of an axis running across the ship might be equivalent in many cases to additional hands, or to a steam-engine of great power; for when acted upon by the water as the ship sailed, they would turn with the force of water-wheels on shore, and might be made to move the pumps, to hoist the sails, and to do any work which a steam-engine could perform. Many a gallant vessel has perished because the exhausted crew could no longer labour at the pumps, and in cases where such water-wheels or a windmill-wheel in the rigging would have performed the duty most perfectly.

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* Brande's Journal.

† Franklin Journal.

SOCIETY OF ARTS.

On Monday, the 2nd of June, the annual distribution of prizes took place at the King's Theatre, in the Haymarket. There were in all 96 prizes. In the department of *mechanics*, there was a sad lack of original invention. The most important subject of the day was, however, in manufactures, viz. a specimen of native manufacture from the hair of the Cashmere goat. Mr. Tower, the gentleman who obtained the large gold medal for his successful speculation in this article, imported some time ago four Cashmere goats into this country, which have now increased to twenty-seven. The first of this breed were brought into France in 1823, by persons who had been sent out to Persia by the French government to obtain the genuine specimens. Mr. Tower's flock are now on his farm in Essex, where they are stated to thrive remarkably well; they feed principally on furze, which they can do without being hurt by the prickles. Their hair is combed at intervals with an instrument like a curry-comb, and in the operation part of the hair comes off, which is used in the manufacture of shawls. The shawl exhibited at the above meeting was gathered in the raw material, spun, and woven in England, so that it is altogether of native manufacture. It was described by the secretary to be superior in texture and beauty to any heretofore produced in Europe, and as the King takes great interest in the success of this manufacture, the shawl is intended as a present to his Majesty, as the first successful sample of British art and industry in this line of production.

During the distribution, the announcement of the female candidates was politely recognised with the applause of the audience. Many of the subjects for which prizes were awarded, are, however, too puerile for the notice of public society, and are by no means calculated to raise the Society of Arts in the estimation of a scientific age like the present. Nevertheless, the majority of the successful subjects are important and interesting, and as our limits will not admit the whole list, we shall enumerate such as appear best entitled to the attention of the reader:—

In Agriculture.

To Lord Newborough, for planting above 3,700,000 forest trees on his estates in Carnarvonshire and Denbighshire, the large Gold Medal.

To Joseph Houlton, Esq. Grove-place, Lisson-Grove, for introducing the roots of *stachys palustris* as an esculent vegetable, the Silver Ceres Medal.

In Chemistry.

To Mr. George Jackson, 30, Church-street, Spitalfields, for his apparatus for instantaneous light, the Silver Isis Medal.

To Mr. T. Cogan, 399, Rotherhithe-wall, for his method of purifying linseed and rape oils, the Silver Isis Medal and 10*l.*

In Mechanics.

To Mr. L. Herbert, 19, Queen-street, Chelsea, for his prepared plumbago, to be used instead of oil for chronometers, the Gold Isis Medal.

To Mr. W. Melvine, 22, Ironmonger-lane, Cheapside, for his detached escapement for chronometers, the large Silver Medal.

To Mr. T. Judge, New End, Hampstead, for his self-adjusting pendulum, the large Silver Medal and 5*l.*

To Mr. C. H. Ackerley, Lieut. R.N., Plymouth, for his safety rods for ships' boats, the large Silver Medal.

To J. Higgins, Esq. 370, Oxford-street, for his revolving lights for steam-boats, the large Silver Medal.

To H. H. Wood, Esq. Commander R. N. for his floating-bridge, to communicate between a ship and the shore, the large Silver Medal.

To Mr. W. Hilton, 10, Regent-street, Pall-Mall, for his ladder-crane, the large Silver Medal.

To Mr. R. Mottershead, for his expanding piston for high-pressure steam-engines, the large Silver Medal and 20*l.*

In Manufactures.

To C. T. Tower, Esq. Weald Hall, Essex, for his flock of Cashmere goats, and for a shawl manufactured from their wool, the large Gold Medal.

In Colonies and Trade.

To the Rev. L. Guiloing, King's Town, St. Vincent's, for his communication respecting the insects which infest the sugar-cane, the Gold Ceres Medal.

To Greg. Blaxland, Esq. Sydney, New South Wales, for wine, the produce of his vineyard in New South Wales, the Gold Ceres Medal.*

PLATING COPPER.

THE principal difficulties in plating copper ingots for rolling, are to bring the surfaces of the copper and silver into fusion at the same time, and to prevent the copper from oxiding or scaling, for which purpose fluxes are used. The flat surface of the copper ingot, on which the silver is to be fixed, must be made true by filing it, and should be left rough from the file; the ingot of silver is first annealed, and afterwards *pickled* in weak muriatic acid; it is then planished, and afterwards scraped on the surface which is to be fitted on the copper. These prepared surfaces are then either wetted with a solution of borax in water, or sprinkled over with finely powdered borax itself, and must be then confined in close contact with each other by binding wire. When they are exposed to a sufficient degree of heat, the flux causes the two surfaces of silver and copper to fuse at the same time, and after they are become cold, they are found to be firmly united, and may be passed through the flatting mills, in order to reduce them to the proper thickness for use.

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* The Mirror.

To strip or remove the Silver from Plated Copper.—This process is employed in order to recover the silver from the scraps of such plated copper as has been rolled down to fit sizes for making buttons, toys, &c. For this purpose a menstruum is composed of a mixture of 3 pounds of sulphuric acid, 1½ ounce of nitre, and 1 pound of water. The plated metal is boiled in this menstruum until the silver is dissolved, and which is afterwards recovered from the solution by throwing into it common salt dissolved in water, which precipitates the silver.

To make an Assay of Plated Metal.—Take a determinate quantity of the plated metal, put it into an earthen vessel, with a sufficient quantity of the above menstruum, and place it in a gentle heat. When the silver is stripped or dissolved it must be collected with a solution of common salt; the precipitate must be tested off with pure lead in a cupelling furnace under a muffle, and the estimate made according to the product of silver so obtained.*

IMPROVED MARINER'S COMPASS.

An improvement in the disposal and hanging of the mariner's compass on shipboard has been made in America. It dispenses with the use of the binnacle; a hole is cut in the deck, within this hole the compass-box is placed, and at top covered by a very thick glass; the bottom of the box is also made of glass, the compass card is made semi-transparent, and the whole lighted from below. By these means the use of a tell-tale is dispensed with, and the compass rendered much more secure than in its former position, as it is as firm as the deck.†

THE WINCH BRIDGE, THE OLDEST SUSPENSION BRIDGE IN ENGLAND.

By W. C. Trevelyan, Esq.

Having, along with my brother, lately made a short excursion in the upper part of Teesdale, where there is some very beautiful scenery, I took the opportunity of examining the Winch Bridge, which is the oldest chain-bridge in Britain, and probably in

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* Richardson's Chemical Principles of the Metallic Arts.

† Monthly Mag.

Europe. As all the accounts of it I have seen are very incorrect in regard to its dimensions, and as I think it interesting to preserve an account of it, I send you the measurements which we took.

The Winch Bridge is formed of two chains, composed of links *six* inches in length, the iron of which is 1½ inch in circumference. The floor, which is laid on the chains, is *eighteen* inches wide, and has a hand-rail on each side. The chains are fixed by bolts into the rocks at each end. The lengths of the chains are as follow:—

	Feet.	Inches.
Length of chain between the rocks - -	59	4
———— supported by the rock on N. side	12	0
———————— S. side, not visible, being covered with rubbish.		

The centre of the bridge, which is about three feet lower than the ends, was, on the 2nd of July, 1828, *twenty-one* feet above the level of the water, the depth of which was 8½ feet. This measure is very different from that given in all the printed accounts of it I have seen, which vary in making it from fifty to sixty feet high.

The bridge, which is in a decayed state, and not pleasant to pass over, is steadied by two chains, which are passed round the floor, and fixed in the basalt rocks on the west side.*

SUBSTITUTE FOR THE STOMACH-PUMP.

A SMALL pump, called the *stomach-pump*, has lately been introduced into practice, for removing poisons from the stomach in cases where the action of vomiting cannot be excited. It has already saved many lives. It resembles the common small syringe, except that there are two apertures near the end, instead of one, which, owing to valves in them, opening different ways, become what are called a *sucking* and a *forcing* passage. When the object is to extract from the stomach, the pump is worked while its sucking orifice is in connexion with an elastic tube passed into the stomach, and the discharged matter escapes by the *forcing* orifice. When it is desired, on the contrary, to throw cleansing water or other liquid into the stomach, the connexion of the apertures and the tubes is reversed.

As a pump may not be always procurable when the occasion for it arises, the profession should be aware, that a simple tube will, in many cases, answer the purpose as well, if not better. If the tube be introduced, and the body of the patient be so placed that the tube forms a downward channel from the stomach, all fluid matter will escape from the stomach by it, as water escapes from a funnel by its pipe; and if the outer end of the tube be kept immersed in liquid, there will be during the discharge a syphon action of considerable force. On changing the posture of the body, water may be poured in through the same tube to wash the stomach. Such a tube, made long enough, might, if desired, be rendered a complete bent syphon, the necessary preliminary suction having to be made by a syringe, or by the mouth through an intervening vessel.

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* Brewster's Jour.

But there is a still easier mode than either of these now described, of dislodging poison from a torpid stomach, viz. merely to place the patient so that the mouth shall be considerably lower than the stomach,—as with the body lying across a chair or on a sofa, and the face brought near the floor,—and then if necessary to press on the stomach with the hand. The cardiac orifice opens readily in such a case, and the stomach is emptied like any other inverted vessel.*

CANAL LOCKS.

An important improvement in the structure of the locks of the *Union* canal, from Reading to the Susquehannah river, was planned and carried into effect by the very intelligent and skilful engineer (Mr. C. White) who superintended its construction. This improvement consists in the suppression of the breast wall, and making the upper gate nearly of the same depth as the lower one. The bottom of the lock has a slight slope, and the upper reach of the canal is gradually deepened until its bottom reaches the same level as that of the lower. As the breast wall is the weakest part of a lock, and adds considerably to the expense of construction, while it involves, in addition, the cost and inconvenience of lateral culverts in the walls, this improvement may be considered as very important; it is, in truth, the only change of real value that has been introduced into the structure of locks, since the time of the opening of the canal of Languedoc. We have seen a proposal for a similar change in the form of locks, made by a French engineer; and although he is, doubtless, no plagiarist, still it is proper to state that Mr. White's locks were not only planned, but built and in actual use before the French publication made its appearance.†

EXHIBITION OF THE NATIONAL INDUSTRY OF FRANCE.

This great exhibition of the production of the arts, sciences, and manufactures of France took place on the 3rd October, 1827, was honoured with the approbation of his Majesty Charles X.

This munificent sovereign, whose patronage of the arts and sciences is not equalled by any of the princes of Europe, conferred the decorations of the Legion of Honour on twelve of the most distinguished artizans, and adjudged *twenty-two* gold medals, *seventy-one* silver medals, and *sixty-nine* medals in bronze,

* Arnott's Physics.

† Correspondent—Brande's Jour.

for improvements connected with the manufacture of silken, woollen, cotton, and linen fabrics. For works performed in metals, 10 gold, 27 silver, and 58 bronze medals.

For improvements in machinery, 2 gold, 8 silver, and 11 bronze medals. For mathematical and musical instruments, 7 gold, 5 silver, and 20 bronze medals.

For discoveries in chemistry, 4 gold, 11 silver, and 24 bronze medals.

For productions in the fine arts, 2 gold, 11 silver, and 12 bronze medals.

For china and pottery-ware, 2 silver and 6 bronze medals. And For various arts, including printing, 2 gold and 4 silver medals.

The total medals adjudged were,

Gold medals - - -	48
Silver medals - - -	139
Bronze medals - - -	217
Total - - -	404

⁂ The editor of the *Journal of Arts*, from whose pages we take the preceding statement, asks, What would be the effect of such an exhibition in London? We extend the question by asking, What would be the effects of such an exhibition in London, Dublin, and Edinburgh? and we venture to answer it.

The artists of France and of all foreign countries have, within the last ten years, not only been rivalling those of Great Britain, but in many points they have greatly surpassed them, and the consequence is, that Great Britain is rapidly sinking from the prominent position which it formerly held in the practical, and even in the scientific arts. This is owing to the neglect of the arts and sciences by every successive government by which we are ruled. The concerns of faction, and the urgencies of political, financial, and commercial transactions, occupy all the time and all the anxieties of our Ministers. No applications, however disinterested,—no remonstrances, however eloquent, can make the slightest impression in favour of science and the arts. Even those who devote their time and their money to introduce new arts and new materials of art, without any view to their own advantage, are checked and harassed by the oppressive regulations of our excise laws and our custom-house regulations, and are driven in utter despair from their patriotic position.

In other countries no such obstructions exist. Public boards, whose objects are of a scientific nature, are there composed of scientific and practical men; whereas here scientific and practical men are entirely excluded; and the consequence of this is, that the concerns of these boards are conducted at a most inordinate expense, and all improvements, and all inventions which are brought forward to promote their objects, are overlooked or rejected.*

THE CLARENCE BRIDGE.

A CORRESPONDENT has sent us a prospectus of a new bridge across the Thames, to be entitled the Royal Clarence Bridge, and to extend from Church-street, Lambeth, to the Horse-Ferry-road, Westminster; and upon his showing, the bridge will be an important addition to public convenience. It is proposed to erect it of cast-iron, of seven arches, with stone piers and abutments, and the whole is to be completed at the cost of 120,000*l*. The capital is to be raised in shares.*

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* Brewster's Jour.

MR. PERKINS'S PATENT EXPANSION STEAM ENGINE.

Mr. Perkins has lately constructed a steam engine, which differs considerably in its principle and details from the other engines, with designs of which Mr. P. has favoured the public. Steam at an enormously high pressure (1,400lbs. to the inch) is used, but on the plan of acting expansively—somewhat after the mode followed by Mr. Woolff several years ago.

Two steam cylinders are placed by the side of each other; the area of the larger cylinder being eight times that of the smaller one, and a communication is formed between the two by a small pipe. Steam at the above-mentioned pressure is admitted into the small cylinder, acts upon the underside of its piston; and is cut off after the piston has travelled one-eighth part of its upward stroke, carrying with it, also, the piston of the large cylinder. When the small piston arrives at the top of its cylinder, the steam passes immediately through the small communicating pipe, and enters the top of the large cylinder, where it now exerts its *expansive force* upon the top of this piston, and forces the *two* pistons downwards, escaping through lateral apertures at the bottom of the cylinder into a condensing vessel. In this last vessel, a portion of the steam is condensed by a jet of water being thrown in; the remaining portion is blown off. The pistons are connected to cranks above them, and placed at acute angles with respect to each other; thus acting nearly at the same time, for reasons to be afterwards explained. It will be observed that the engine is, in fact, what may be termed a single stroke engine, but that the same steam is allowed to act upon two pistons, thus effecting, with great force a downward stroke, without which the momentum of the fly would have to accomplish it, as in Mr. Perkins's first modification.

Of the actual power of this engine, nothing is accurately known. The subtle nature of the steam used seems to be the principal cause that prevents its general introduction, it being impossible for the utmost nicety of workmanship to prevent its escape. The extreme violence of its action is also a great drawback. The steam (to use a technical term) *ran through her;* and, indeed, the action was so violent as to loosen and break the screws, &c. &c.

We recommend the scientific reader to turn to Nos. 267 and

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* The Mirror.

268 of the *Mechanics' Magazine*, where Mr. Perkins's important improvement is illustrated by numerous diagrams and further details, by the ingenious Mr. C. Davy, the architect.

EXPLOSION OF STEAM BOILERS.

It appears, by the numerous experiments of Mr. Perkins, that a fact, hitherto supposed to be well established, has been controverted; namely, "that the caloric, or heat of steam, at a given elasticity, is invariably the same when in contact with water." He has, by experiment, proved that steam may be generated to very high degrees of temperature without a corresponding increase of power. He illustrates the theory of sudden explosions, by supposing that, for want of a regular supply of water to the boiler, the water sinks below those parts which ought to be completely covered by it; which parts, being left uncovered, become much hotter than the water itself; and as caloric will not descend in water, "it cannot be taken up" by the water which is below it. The steam becomes accordingly, in this instance, so much surcharged with heat, as to *heat the boiler red hot*. But should the water, by any means, be made to take up the excess of heat contained in the steam generated, as well as the heat contained in the upper part of the boiler, by drawing off the steam, so as *to allow the water to rise*, by relieving the pressure; the water would instantly, in coming in contact, flash into steam of such power, that no safety valve whatever could prevent an explosion. It probably may be in the recollection of many, that a shocking steam-boat accident happened at the very time the steam *was being blown off*, after its journey was completed,—an occurrence which seems to substantiate the statement of Mr. Perkins, namely, that the pressure of steam being removed instantaneously from the surface of the water, allows the latter to rise and be converted into highly elastic steam, which produces the dreadful consequences before mentioned. Boilers, too, as they are ordinarily constructed, occupy much space, and the room in which they are situated is not unfrequently filled with lumber,—one of the most injudicious things possible; for it cannot be too often repeated, that wood, and other combustible substances, have been ignited by being in contact with the boiler under such circumstances.*

STONE DIALS.

The faces of the clocks of the new churches at Chelsea and Norwood, of the Royal Mews, Pimlico, and of the new clock tower, Windsor Castle, have all, on the recommendation of Mr. Vulliamy, the eminent horologist, been made of stone. In a small pamphlet which Mr. V. has published on the subject of public clocks generally, he says,—"Stone being an absorbent, and not so good a conductor of heat as metal, the paint adheres better and lasts longer, and does not require to be renewed so often as on the copper dial. Another advantage of the stone dial is, that the centre can be sunk, and the hour hand made to traverse in the sinking. This enables the minute hand to be close to the figures, and then almost all error from the effect of parallax is avoided, which, in the copper dial, is very considerable; especially when the minute hand points at or near 15 and 45 minutes, and the hands are both above the dial. In the stone dials of Chelsea new church, and the Royal Mews, Pimlico, the figures are cut in the stone, and sunk about the eighth of an inch, after the manner of the Egyptian monuments, from which I derived the idea. By this method, supposing the dial accurately divided, and the figures well shaped in the first instance, they will always remain so."

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* Mechanics' Mag.

PERCUSSION RIFLE, IGNITING BY A SPRING INSTEAD OF A LOCK

The stock of this rifle is made either of iron or bronze, hollow in the centre, and the barrel is made to screw into it at the breech. The spring acts horizontally, and is screwed to a plate, fixed to the left side of the small of the stock. A cross piece is attached to the fore part of the spring, which passes through the stock behind the breech, and projects a little on the left side. In the cross piece there is a notch and a button at the end of it;—the trigger moves upon a pivot in the upper part of the stock, and is pressed forward by a spring behind it. The piece is cocked by grasping the small of the stock with the fingers of the right hand, and pressing the thumb against the button of the spring until the notch comes opposite the trigger. The cap is then put on the nipple, and the spring let down upon it, by again placing the thumb against the button, and pulling the trigger with the middle finger. In that position the spring is allowed to remain, until the piece is about to be used, when it is again cocked and fired off. A piece of leather is put round the small of the stock, to make it more pleasant to the touch; and a box placed behind it, for holding caps and patches. The power of the spring may be increased or diminished at pleasure, by turning the screw.

This contrivance, it is conceived, produces fire more instantaneously than a common lock, from its having no friction. It is also less liable to get out of order; and a gun can be constructed on this principle, at about half the expense of that now generally in use.

A rifle of this construction was tried at Woolwich in August, 1827; from which the great superiority of percussion over the flint-lock is very apparent, as the penetration of the percussion rifle is not very much inferior to that of the flint-lock, with a much heavier ball, and four times the quantity of powder. The penetration of the percussion rifle also does not appear to be increased by increasing the charge beyond a dram; which tends to prove, if any proof were wanting, that moderate charges are the best, and that heavy ones only tend to destroy arms, and an unnecessary expenditure of ammunition, without producing any corresponding affect.*

MESSRS JONES AND CO.'S PATENT IRON WHEELS.

It is well known to all who have paid any attention to the construction of carriage wheels, two of the improvements now in greatest request are, *first*, that they shall be so made, as that the whole breadth of the wheels shall bear equally on the ground; and, *second*, that they shall be constructed of some material (as iron) which will wear better than wood, and not be so frequently out of order. Among the most obvious benefits consequent on these improvements, would be a great saving of the roads, a great saving of animal labour (since the less the injury to the road the less the toil to the horse,) and a great saving in coachmakers' and wheelwrights' bills. So very serious, indeed, is the injury done to roads by the conical rimmed wheel, now generally in use, considered to be, that by one of the recent acts of parliament for the General Regulation of the Turnpike Roads (3 Geo. IV. c. 126, s. 9,) it is specially enacted, "That where any wagon or cart shall have the sole or bottom of the wheels thereof rolling on a flat surface, and the nails of the tire of those wheels countersunk and cylindrical, that is to say, of the same diameter on the inside next the carriage as on the outside, so that when such wheels shall be rolling on a flat or level surface, the whole breadth thereof shall bear equally on such flat or level surface, and shall have the opposite ends of the axletrees of such wagon, cart, or other carriage, so far as the same shall be inserted into the respective naves of the wheels thereof, horizontal, and in the continuance of one straight line, without forming any angle with each other; and in each pair of wheels belonging to such carriage, the lower parts, when resting upon the ground, shall be at the same distance from each other as the upper parts of such wheels;" it shall be competent to the trustees or commissioners of any turnpike road to make an order, that every such wagon or cart shall pay *one third less toll* than carts or wagons constructed on the old plan.

We have now the pleasure of introducing to the notice of our readers and of the public, a mode of constructing wheels, by which, in our humble opinion, *both* of the *desiderata* above mentioned are realized, and all the conditions that form the sort of premium held out by the legislature for the improvement of carriage wheels are completely fulfilled; not only so, but by which many other valuable, though perhaps subordinate, advantages are gained. The inventor is a Mr. Theodore Jones; to whom, and his partners, the invention is secured by patent.

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* Phil. Mag.

The reader is, of course, aware that the common wooden wheels have hitherto been made so that the spokes under the nave sustain the weight, or load. All previous attempts at constructing iron wheels proceeded upon the same principle; in consequence of which the iron spokes have invariably yielded to the shocks or concussions received in rapid motion, and broken short off either at the nave or the outer circumference. Now, according to the plan of Mr. Jones, the wheels are so constructed that the weight or load which they have to carry is suspended from that part of the wheel which happens to be uppermost, instead of being supported, as is usual, by the spokes which happen to be under the axletree.

The spokes consist of iron rods, of small diameter compared with the spokes of common wheels. As the wheel revolves, the nave does not press upon the rods at all; it is held to the upper arch of the outer rim of the wheel, so as to sustain the load by suspension; and while this mode of construction gives excessive strength, it produces a light and elegant appearance.

The parts of which the wheel is composed may be thus more circumstantially enumerated. First, there is a rim of iron of sufficient substance; the weight or load is held in the centre by a nave and box of iron, containing hollow cells; iron rods are passed through the rim and into the nave, where they are held by means of a nut, but with end play; the rods having no shoulder whereon the nave can rest, suspend the weight from the top of the rim, or outer circumference, of the wheel; each rod varying, according to the intended wheel, from half an inch to an inch in diameter, would carry from 5 to 25 tons, and the arch-like circumference is held in that form, by the rods passing through. It will be obvious that the parts cannot separate or fall asunder, for the rods fix and bind the circumference to the centre; and no blow or concussion in travelling can shake or alter it. The effect of the most violent shock is only to force the rod slightly into the nave for an instant of time; the wheel revolving, brings its suspensive power into play, and restores its strongest form of application. The wear of the common wheel tends to its falling asunder; but as Mr. Jones's wheel is held from the circumference to the centre, every movement tends to compress and fix it more firmly together.

We subjoin a statement of the principal advantages which Mr. Jones claims for his patent iron wheel; and, having ourselves personally examined its construction, have no hesitation in adding our individual testimony, that he claims no more merit for it than it actually possesses. In one respect, indeed, the superseding entirely of linch-pins or screws, we think he understates the advantages of the new wheel considerably. We can imagine nothing more perfect than the arrangement for this purpose, or more satisfactory than the security it affords.

"1. Greatly increased durability, from being made wholly of iron, and consequent cheapness, as the first cost differs but little from the common wheels.

"2. Being perfectly cylindrical, the wear of the tires, as well as of the roads, is much reduced. The wheels roll over, and do not grind upon the surface of the road.

"3. From this form, also, results a diminished draught for the horses.

"4. Every part of the wheel is easily repaired.

"5. The mode of oiling is extremely simple, and is only necessary twice or thrice in a year, and is then effected without taking the wheels off the axle; whereas the common wheels have to be taken off the axle, and greased once a week. This is a constant saving, and will be highly beneficial in practice.

"6. The axles for wagons and carts are at liberty to revolve, and the wheels are secured to them without linch pins or screws; so that it is scarcely possible they should come off by any accident whatever; and for lighter carriages, the safety and security in that particular is as nearly complete as, it may be presumed, can ever be effected.

"7. Being made entirely of iron, they are not subject to decay and destruction from the change of weather or climate. They neither expand in a wet season, nor shrink in a dry one; and in the most unfavourable climate no insect can do them injury.

"8. They may be made of any conceivable strength, so as to endure heavier work than any other wheels whatever.

"9. They are of value when done with, as iron; whereas wooden wheels when worn out, are worth very little.

"10. When the eye becomes familiarized to their light and elegant appearance, the common wheels, when contrasted, must appear heavy and clumsy.

"11. Increased safety; for as they stand on a wider base, there is much less liability that the carriage should be overturned.

"12. Gig wheels are found, on comparison, to run more quietly."

Several carts and wagons, with wheels constructed on this plan, have, we understand been in use for some months past, in and about the metropolis, and have, *without exception*, realized all the advantages which they promised.*

HEATING WATER BY GAS.

(See Engraving.)

WATER might be heated by the gas lamps of shops, by simply having a double funnel over the flame, the vacuity filled with water, and communicating with the reservoir to be heated by a going and returning pipe. No house in London having a shop, need require any fire-places or chimneys but for the purpose of cookery: and, indeed, were gas only a little cheaper, fires in large cities might be dispensed with altogether. It would be easy to render gas an elegant substitute for a fire in a drawing-room; while the heat, as it passed up the chimney, might be communicated to pipes connected with reservoirs of water for heating other parts of the house. Most kinds of cookery might also be effected by gas; and what could not, would only require a little coke or charcoal. The gas lights of churches and other public buildings might, in many cases, communicate heat as well as light, simply by having a double spiral funnel over the flame, and a going tube *a*, a returning tube *b*, and a pressure or balance tube *c c*, communicating with a reservoir; which reservoir might either be under the floor or in any part of the house between the floor and the roof. But perhaps the best way of heating churches would be to have two or three solar concentrators on the roof, communicating with an immense cistern under the floor. There would at least be enough of sunshine during the week to produce heat for Sundays. The immersion tanks of baptist chapels might be heated in this way, the water of public and private baths, and the mode is applicable to a variety of other cases. The only question is, as to the expense of the concentrators, and the machinery requisite to keep them continually at the proper angle to the sun's rays.*

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* Mech. Mag.

RAILWAY TRAVELLING.

Between Stocton and Darlington, a distance of 12 miles, there is a railway, on which a one-horse stage-coach plies regularly at the rate of 10 miles and a quarter an hour; carrying 6 passengers inside and 16 out. There is a talk of constructing a similar railway between Glasgow and Paisley; one between Southwark and Greenwich would tell well.†

NATIONAL REPOSITORY, CHARING CROSS.

One of the most important contributions to the history of mechanical science during the past year, is the formation of an establishment for an exhibition of new and improved productions of the artisans and manufacturers of the United Kingdom. It is nearly on the plan of the *Societe des Arts et Metiers*, at Paris. Its introduction originated with the Honourable G. Agar Ellis, M.P., F.R.S., and a few other patriotic gentlemen, who constitute the board of management, assisted by a committee of inspection, to decide upon the merits of the articles sent for exhibition.

The Establishment soon obtained the patronage of His Majesty, and the grant of the upper gallery of the south-west side of the King's Mews, for their exhibition-room. This room, or gallery, is 248 feet long, and 20 feet wide, and has numerous doors leading into a series of rooms, 35 in number, part of which are already appropriated, such as secretary's private room, board room, counting-house, &c.; some are particularly reserved for the reception of products as they arrive from our chief manufacturing towns,—as Birmingham, Leeds, Glasgow, Macclesfield, Manchester, Nottingham, Sheffield, &c.

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* Gardener's Mag. † Mech. Mag.

Before we enter into a description of a few of the most ingenious productions now exhibiting at the Repository, it may be as well to give an outline of the plan, &c., collected from the papers of the Society.

Board of Management.

Chairman—The Hon. G. Agar Ellis, M.P. F.R.S.

George Birbeck, M.D. F.G.S.; John Hales Calcraft, Esq.; John Earl of Clare; Henry Drummond, Esq.; Hugh Viscount Ebrington, M.P.; Hon. G. M. Fortescue, M. P.; George Granville Earl Gower; Lord Francis L. Gower, M.P.; John Labouchere, Esq.; George Viscount Morpeth, M.P.; Hon. Granville Ryder; Dudley Viscount Sandon, M.P.; C. Baring Wall, Esq. M.P.; Alexander R. Warrand, Esq.; Hon. J. Stuart Wortley, M.P.

Treasurer—J. Labouchere, Esq. *Secretary*—T. S. Tull, Esq.

Bankers—Messrs. Williams, Deacon, Labouchere, and Co.

Committee of Inspection.

Chairman—George Birbeck, M.D. F.G.S.

Outline of Plan.

First Class.—Entirely new and ingenious constructions of any sort, where a new principle is discovered, or one before known, but never practically adopted, is brought into operation.

Second Class.—New adaptation of some known principle, but in a manner essentially different from all that has been done before in that line of manufacture or mechanical workmanship.

Third Class.—Every sort of improvement upon a discovery already made, by which the preparation of any article is facilitated, or its utility increased. In this class may be exhibited also such objects as are highly finished, or distinguish themselves by exquisite taste; likewise every description of elaborate workmanship, such as would not find a place in an exhibition of arts.

Sub-Committees of Inspection.—Chairman to be in profession a civil engineer; ditto, a person well acquainted with chemistry and chemical arts; ditto, a person well acquainted with silk, cotton, woollen, and linen manufactures; ditto, a mathematical instrument-maker; ditto, a person well acquainted with workmanship in all kinds of metals.

Resolved—That the decision of the sub-committee, with regard to the reception of articles submitted to their inspection, as well as to the class to which they may belong, shall be final, when such decision shall have been signed by the chairman of the general committee of inspection.

Resolved—That the presidents, vice-presidents, and secretaries, of all the Mechanics' Institutions in the United Kingdom, be invited to take on them the office of committee of inspection, with power to add to their number in their respective districts, with the same power of deciding upon the admission of articles as the London sub-committee of inspection; and that a circular letter to that effect be written and forwarded to the several presidents of the Mechanics' Institutions, signed by the chairman of the committee of inspection.

Persons resident in London or its vicinity, who may be desirous of availing themselves of the advantages of the ensuing exhibition, are requested to forward the particulars, with a full description of the articles designed to be sent for exhibition, in a letter addressed to the secretary, and to wait an answer to such letter, which will be sent to their address previously to their forwarding any package containing such articles for reception at the National Repository. Artisans and manufacturers residing at a distance from the metropolis are requested to make application to the president or secretary of the Mechanics' Institution nearest their residence.

⁂ No charge will made for a grant of a place in the gallery upon any articles that shall have been approved of by the committee of inspection. All letters sent by post must be paid.

Royal Mews, Charing Cross, April 8, 1828.

All specimens sent to the National Repository must remain under the control of the board of management until the close of the exhibition; when they will be re-delivered to the owners, unless, at their request, such specimens shall have been sold; in which case, the amount received will be paid to them or to their order, on application at the Repository.

The Exhibition opened in May, 1828, and although the Society has experienced many difficulties in its progress, it already presents a respectable specimen of what may hereafter be accomplished. Before us is the *fifth edition* of the catalogue; from which we select a few specimens of the most ingenious and popular productions.

Nos. 1 to 10 consist principally of specimens of *silk manufactures* recently introduced into this country, which are submitted to prove the ability of English manufacturers to produce a quality of *grenadine* equal, if not superior, in evenness and firmness of texture, to what is usually imported from Lyons.

Nos. 15, 16, and 17, are *silk looms*, the hours of working which are from 9 till 1, and from 2 to 6.

No. 58. *English Mechlin Lace*, the fabric the same as French Mechlin, entirely from British materials.

Nos. 63 to 125. Beautiful specimens of *ornamental glassware*, partly with the crystallo ceramie incrustations—by Pellatt and Green. These are exquisite triumphs of art.

Nos. 126 to 130. *Models of Steam Engines.*

No. 131. *Model of a New Patent Steam Boat Paddle Wheel*, by Lieut. Skene, R.N., of Woolwich. This invention is thus briefly, but lucidly, described by Mr. C. Davy, in the *Mechanics' Magazine*:—

The paddle wheels of steam-boats, as ordinarily constructed, experience a degree of superfluous resistance from the water, while revolving in it, which diminishes materially their propelling power. There can be no doubt that this arises chiefly from the paddles being fixed immovably to the periphery of the wheel; and that if they could be made movable, so as to act always at an advantage only, an immense improvement would be effected. Lieut. Skene has taken out a patent for an improvement on this principle, which we now proceed to describe.

The wheel itself consists of two annular plates or rings of metal, furnished with radiating arms, &c., working in plummer blocks, on the periphery of the said rings of metal. Axes are passed through, on which the paddles are allowed freely to move or swing. The ends of these paddles are loaded, or made heavier than their opposite sides; so that in the revolution of the wheel these loaded paddles vibrate on their axes, and are enabled to emerge from the water in a perpendicular direction. The engine thus exerts a correct force upon each paddle, as it passes through the water. The ends of the paddles project beyond the annular plates or arms, against which they strike, and are prevented from turning over.

For every foot the wheel measures in diameter, Mr. S. proposes to allow one paddle; and each paddle is to measure two feet, having circular ends. If a greater breadth of wheel is required in large vessels, it will be necessary to fix another ring, with a series of paddles placed half way between the other portion of the wheel, so that the whole shall act exactly at one time, but alternately, without interfering with each other.

Lieut. Skene also proposes to employ this description of paddles for water wheels generally.

No. 132. *Model of a Suspension Bridge*, by F. C. Partington. This is a cheap conveyance for crossing a river. A bridge of 60 feet span, will cost less than one hundred pounds. A rudder, or directing line is placed in the car, which directs it to either bank, by clasping the under or upper portion of the endless rope.

No. 136. *Apparatus for laying floors*. Invented by A. Smith. By means of a lever, the flooring boards are first drawn towards each other, and then held in the required position till the nails are introduced.

No. 150. *Kaleidoscopes*, by Holtzapfel and Co.; some of which are filled with circular rings only, producing many novel combinations.

No. 188. *Specimens of an adaptation of the Stereotype process to Copper-plates*. By F. C. Partington. The plaster cast is taken from a copper-plate engraved in the ordinary way, and from that the second plate is procured.

Nos. 189 to 198, consist of *architectural models*, among which are St. Paul's Cathedral, by A. Neale; the Parthenon, in metallic bronze, by E. Thomason; the Catholic Chapel, in Moorfields, by J. T. King; and the Pyramidal Metropolitan Sepulchre, by T. Wilson; all of which are extremely interesting.

No. 205. *Self-registering Rain Gauge*. By F. C. Watkins. This instrument indicates the amount of rain that has fallen on a given space, by a graduated dial and hand. The hands are put in motion by a train of wheels, actuated by a movable reservoir of water; the patented invention of Mr. Samuel Crossley.

No. 208. *Improved Musical Glasses, tuned without water*. By Tait. This plan dispenses with the tedious process of tuning them by water, and destroys the discordant vibration to which the old method was liable even in the hands of experienced performers. The improvement in the present instance consists in the glasses being tuned by grinding them, so that they are at all times in perfect order for the performer, and not liable to be deranged by the evaporation of the water. There is another advantage attendant on this mode of tuning. Water has the effect of increasing, in a sensible degree the vibration complained of. The tops of these glasses are painted, and this also tends to aid in removing the vibration; and, judging by the sweet tones of this specimen, we are of opinion that the instrument may become generally adopted. It is elegantly fitted up in a mahogany frame, and forms a pretty piece of furniture.*

No. 220. *The Royal Filter*, by Messrs. Robins. The materials employed in the construction of this filter are sand, charcoal, and large masses of silica; and in this respect it does not differ very materially from the filters usually constructed, but in the arrangement of the box intended to receive the materials a very important improvement is effected. Mr. Partington has an ingenious filtering machine by capillary attraction, (No. 222.)

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* Register of Arts.

No. 224. *Improved Clepsydra*, by F. C. Partington. For an engraving and description of this water clock, see the *Meteorological* department of this volume.

No. 236. *Patent Iron Wheels.* By T. Jones. See *Mechanical* division, page 72.

No. 251. *Shadowless Lamp.* By Bright. (*See Engraving*) Ever since Argand invented his circular wick'd burner, a variety of modes have been planned for supplying a single burner, so that the oil reservoir shall obstruct the least possible light. Many of these inventions, however, have been too complicated, and liable to clog when in use. Bright's lamp is on Hero's fountain principle, giving a uniform and shadowless light, and its action is as complete as the celebrated Parisian lamp, by Carcel, without his complicated machinery.

The principle of this lamp will be easily understood by the annexed vertical section. The water vessel *b*, is an inverted fountain which empties itself into the air chamber *o*, through the pipe *d*; the air thus displaced is forced up the rising bent tube *e*, into the oil vessel *a*, from whence as it cannot escape it presses upon the oil, and forces it up the pipe *f* to the burner *g*. It will be seen that by this arrangement the two columns of oil and water will always be in equilibrio.

The additional trouble in trimming, is filling two reservoirs instead of one, as in ordinary lamps.

No. 266. *Patent Peripurist or Cooking Apparatus*, by Tozer and Co. For a description, see *Domestic Economy.*

No. 272. *Patent Mill for Husking Indian Corn.* This machine is a very simple, compact, and effective contrivance. The *Engraving* represents a side elevation, with the hopper in section :—*a* is a crank handle or winch, which, being turned, gives motion to a spur wheel *b*, and thereby causes a rapid revolution to a pinion *c*, on the shaft of which is fixed a large circular cast-iron plate *d*, (seen, like the wheels, edgeways) the operating flat surface of which is studded all over with very numerous cast-iron knobs or teeth : *e* is the hopper of the figure, of a narrow inverted quadrangular pyramid; it has one of its sides movable and capable of a very simple adjustment, by turning as a lever upon a fulcrum at *g*, by which movement the aperture of discharge *f*, is enlarged or contracted, and it should be so regulated as only to admit of the central stalks of the cobs of Indian corn to pass, which differ in size according to the fertility of the soil, the climate and agricultural treatment of the plant. At *h* there is a curved slot mortice through the side of the hopper, through which the stem of a thumb-screw passes from the outside into the movable plate, which is confined at pleasure in the required position by a half turn of the screw.

These machines, we are informed by an American farmer, are usually worked by one person turning the winch *a*, which gives very rapid revolutions to the large toothed plate *d*, while a boy drops one by one the cobs of Indian corn into the hopper, which causes each cob successively to spin round upon its axis or stalk with great velocity, rubbing or knocking out the grain in its progress. The effectiveness of this process may be judged of when we inform our readers that a single turn of the winch completely husks or shells a large cob of maize.*

No. 276. *Steam Paddles*, by J. L. Stevens. This invention is an improved method of applying power in propelling vessels; consisting in a

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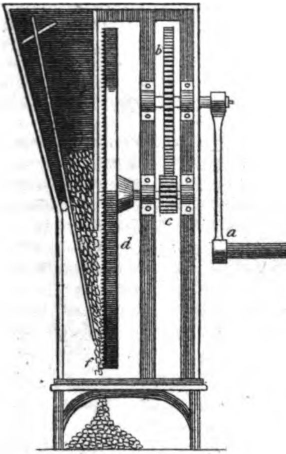
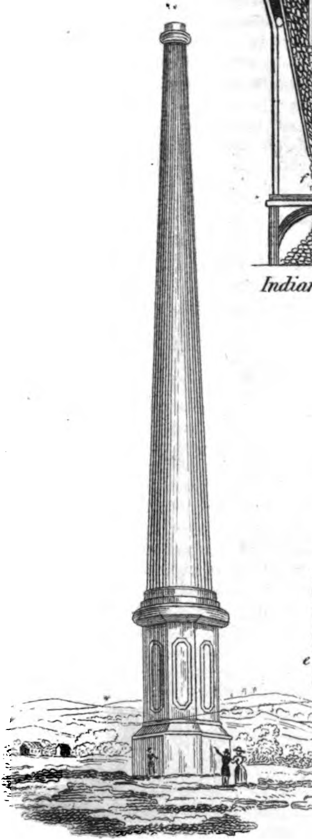
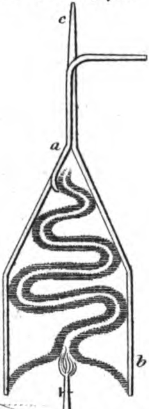
* Register of Arts.



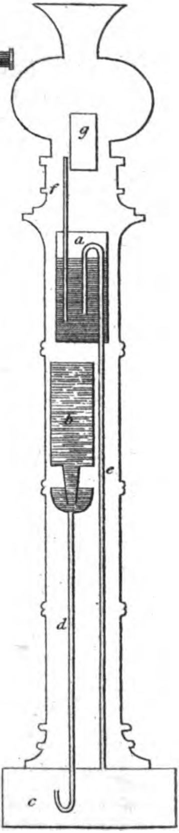
Indian Corn Mill. p. 78.



Chimney of the East London Water Works. p. 6



Heating Water by Gas. p. 73.



Bright's Shadowless Lamp. p. 78.

series of paddles attached to a three throw crank, to which a peculiar motion is given by radius and guiding rods; and it may be used as a substitute for undershot water wheels.

No. 277. *Cook's Life Buoy.* The life buoy contrived by Lieut. Cook, is furnished with a fusee, which can be lighted at the moment of immersion, which thus serves as a beacon light to guide the person who has fallen overboard from the vessel.

No. 296. *Model of Don's Patent Metallic Shutters and Sun Blinds.* These shutters are constructed of sheets of metal strongly framed, so as to render them impervious to burglars; they are arranged horizontally, so that, when the premises are closed, each forms a handsome panel, and, when withdrawn, they are deposited behind the entablature, or in the brickwork above or below the windows.

Among the most recent additions, are a beautiful perspective of the Thames Tunnel, illuminated; and a *Triennial Clock,* by Pace, of Bury, which only requires winding up once in three years. Altogether, the Repository promises to become one of the most important and interesting of the London exhibitions. The editor of the *Register of Arts,* has illustrated several of the specimens in the present exhibition in his valuable work; and these illustrations will form an excellent supplement to the catalogue published by the society, which has been lucidly drawn up by their ingenious secretary, Mr. Tull. The *second* exhibition, which will open in May next, will, it is expected, in extent and importance, treble the present; a lively interest being not only taken in it by THE KING, but by the cabinet ministers and some of the most influential nobility.

ENGLISH AND FRENCH MEASURES.

M. M. MATTHIEU, Legendre, and Dulong, lately made a report to the *Academie des Sciences,* on M. Francour's memoir relative to the comparison between French and English measures.

The proportion of the imperial English yard to the French metre was obtained with great precision by an intermediate comparison of the two standards. The metre = 39, 37079 English inches, and the yards = 0, 91438348 of a metre. The ounce was determined = 31, 0913 grammes; a result considered to be within from 2 to 4 millegrammes of truth.

EXPANSIVE FORCE OF STEAM.

A CIRCUMSTANCE lately occurred, rather of a singular nature, which strongly illustrates the powerful effects of steam. A strong stone bottle, half filled with water, and tightly corked, was placed by a servant girl in an oven; and forgotten. The water of course began to be converted into steam (by the heat of the oven) which burst the bottle, and was so expansive as to drive the oven door, which was of cast-iron, from its hinges, against the kitchen wall, with such violence, that it was broken into several pieces. The oven itself, though of considerable weight, was carried from its seat, blew out both the kitchen windows, and tore down the fire-place. Several children were playing in the kitchen, but they fortunately escaped injury.*

IMPROVED PATENT PAPER MAKING MACHINERY.

The present patentee, Mr. George Dickinson, has had several patents for former inventions in paper-making apparatus, and he appears, by his talents and ingenuity, to be well qualified for the undertaking.—This patent is for improvements on those machines in which the paper is made in a continued length. In them the pulp is delivered from the trough on to an endless web of wire, passing over cylinders which are turned by steam, or any other prime mover. From the wire-web it passes between two rollers on to an endless web of felt, which passes over other cylinders, and between two other heavy rollers, for the expression of the water; the paper is thence wound upon a reel, and when a sufficient quantity is received on it, the paper is cut off and removed to the drying-house.

In those machines it is likewise found necessary to communicate a shaking motion to the wire-web, in order to separate a portion of the water from the pulp, which is of a very thin or watery consistence when first received on the web, and for the further essential operation of felting the fibres. This motion is generally given in a horizontal and lateral direction; but in the present machine Mr. Dickinson causes the web to vibrate rapidly in a *vertical direction*, and *by rarefying the air under the endless web of wire*, causes the atmosphere to press upon the superior surface of the paper, by which a further portion of the water is driven through the paper into the rarefied apartment beneath, and thus the paper is more speedily and effectually dried, than by the machine at present in use. After the paper has quitted the wire-web, it is received on to the web of felt, then passed between rollers, and thence to the reel, as in the ordinary machines before described. From this account somewhat of the nature of the machine may be understood.†

IMPROVEMENTS IN EVAPORATING FLUIDS, GENERATING STEAM, ECONOMISING FUEL, AND LESSENING THE FRICTION IN MACHINERY.

By Jacob Perkins, Esq. Engineer.

Knowing the superior conducting power of metals, for heat, over that of water, Mr. Perkins made the following experiment:—He caused two circular blocks of cast-iron to be made, with flat bottoms, and a hemispherical cavity in each of them, of about three inches in diameter; one of these cups or cavities he left plain, but he filled the other with conical projecting points of cast-iron, formed at the time of moulding it. Upon heating both vessels

* Mech. Mag. † Register of Arts.

to the same degree, and putting water into them, he found, as he expected, that the water in the vessel filled with the metal points evaporated much faster than that in the other vessel. He next caused some iron cylindrical tubes to be cast, having radiating ribs proceeding from the interior surface of each cylinder all round to the centre of it, where they terminated in thin edges. Two of these he connected with his tubular high-pressure steam generators, and placed them in that part of his furnace where the heat was the greatest. Here, owing to the rapidity with which the caloric is given off to the water, through the superior conducting property of the metal, the tubes never become red-hot, and are, consequently, not so liable to injury from the heat of the furnace as his other tubes were, whilst they generate steam most rapidly.

Mr. Perkins's Mode of Economising Fuel.—He purchases the refuse, or smaller parts of gas-coke, which he sifts, so as to separate the minuter parts from those of a larger size; the latter he employs as fuel in the usual manner, but the dust he mixes with one-thirtieth part of clay and water, and strongly compresses the mass in a cylindrical tube, out of which it falls in cylindrical pieces, more or less long. These he dries upon the top of his furnace, and they are then as capable of being burnt in it as the ordinary gas-coke. By this means, he has actually been enabled to work his high pressure steam-engine, alone, or without doing any work for twelve hours, at the trifling expense of eleven-pence halfpenny! And, no doubt, the same economy will be experienced, in a proportionate degree, in whatever work the engine may perform.

Mr. Perkins's Mode of Lessening Friction in Machinery.—He has succeeded in avoiding the necessity of employing oil, grease, or any other lubricator to the piston of the steam-engine, in the following manner. His piston is formed of a bell-metal, com posed of the following materials:—

Copper	- -	20 parts.
Tin	- - -	5 do.
Zinc	- - -	1 do.

This, as well as his cast-iron cylinder, is cast under the pressure of a considerable head of metal; by which means, the density and closeness of grain of both of them is very greatly increased, and, indeed, the cast-iron has as close a grain as wrought iron itself! These two metals he finds to act so as to polish each other in use.

He also uses the same dense cast-iron to form his steam-engine crank-axes, and the spindles or axes of his grindstones, &c. with; and he runs the cylindrical necks of them upon bearings formed of his bell-metal, placed underneath them, and made with hollow cylindrical cavities, across their upper faces, not exceeding the sixth part of a circle in extent; and yet, upon these very small bearings, his necks run, with a very trifling portion indeed, of grease, as a lubricator to them; whereas, as is well known, the bearings commonly in use are semi-circular.

In this manner, the cylindrical necks of the axis of a large grindstone, employed in grinding large articles for the hire, run; and yet, on throwing off the band from the rigger, or band-wheel, the stone will make fifty revolutions, at the least, before it stops![*]

SOCIETY OF CIVIL ENGINEERS.

A CHARTER of incorporation has received the royal signature, constituting an institution of Civil Engineers, and naming Mr. Telford its president. The objects of such institution, as recited in the charter, are, "The general advancement of mechanical science, and more particularly for promoting the acquisition of that species of knowledge which constitutes the profession of a civil engineer; being the art of directing the great sources of power in nature for the use and convenience of man, as the means of production and of traffic in states, both for external and internal trade, as applied in the construction of roads, bridges, aqueducts, canals, river navigation, and docks, for internal intercourse and exchange; and in the construction of ports, harbours, moles, breakwaters, and light-houses, and in the art of navigation by artificial power, for the purposes of commerce; and in the construction and adaptation of machinery, and in the drainage of cities and towns."[†]

SHELL, EXPLODING BY PERCUSSION WHEN TROD UPON.

By Lieut.-Colonel Miller, F.R.S.

THIS is a very simple contrivance. A spring is attached to the upper part of the shell, which produces ignition by falling on a copper cap; and a support is placed under the spring, moving on a hinge, with a handle attached to the support; so that by treading on the handle, the support is withdrawn, the spring falls, and explosion follows. The sides of the shell must be of equal thickness, for the better splintering; and as an oval form will be the most convenient for fixing the spring. The following construction is given:—

Length of shell	8	inches.
Breadth of ditto	5 5	
Depth of ditto	5	
Length of chamber	6	
Width of ditto	3.5	
Height of ditto	3	
Length of spring	6	
Fall of ditto	1	
Length of handle	from 10 to 30	

Shells of this description, it is conceived, might be made to perform the duty of sentinels on many occasions, by giving notice of the approach of an enemy, and presenting a considerable obstacle to his advance by their explosion. They might accordingly be used with advantage in the ditches of fortresses, before breaches, and to defend bridges and passes, wherever an enemy is likely to attempt a surprise. They might also be placed around field works likely to be attempted by assault. They would require to be sunk a little in the ground, so that the splinters of one might not derange those near to it, and covered lightly over to protect them from wet, and also to conceal their position from an enemy.*

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[*] Gill's Repository.

[†] The Mirror.

MR. BABBAGE'S CALCULATING MACHINERY.

THE following extract from a letter addressed to the Editor of the Times, gives a satisfactory report of the progress of one of the greatest discoveries of modern times:—"Having been requested by Mr. Babbage to superintend, in his absence, the progress of his important invention of a machine for calculating and printing mathematical tables, and having been in consequence an eye-witness, for many months, of the work actually executing, as well as having been intrusted by him at the same time with the disbursement of the current expenses, I am enabled to state from certain knowledge, that the whole amount of the sum originally advanced by Government has been *bona fide* expended on the object of its destination. It has, however, proved very far from sufficient to cover the expenses of the undertaking, the deficit having been supplied from the private purse of the inventor. To those conversant with mechanism, and who are aware of the multitude of tools to be invented and constructed where machinery of a nature entirely new is to be executed on a large scale, and with perfect precision, this will not appear extraordinary; nor that an expenditure of time, talent, and money, much beyond what was originally contemplated, may take place without affording room for any well-grounded charge of profusion. The work, meanwhile, continues in active and steady progress; but such is its extent, such the variety of mechanical movements to be contrived and executed, and such the elaborate perfection of workmanship which it has been found necessary to bestow on all its parts, to afford a moral security for its successful action when put together, that a very long time must yet elapse, and a very heavy farther expense be incurred, before it can be completed; but no suspicion of a failure has yet arisen. On the contrary, every mechanical difficulty has been completely overcome, nor has any obstacle occurred in the slightest degree calculated to raise a doubt as to its ultimate success.

"*Slough, August* 15. J. F. W. HERSCHEL."

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* Phil. Mag.

CHEMICAL SCIENCE.

ON THE PHENOMENA OF VOLCANOES.

By Sir Humphry Davy, Bart. F.R.S.

In a paper on the decomposition of the earths, published in the Phil. Trans. for 1812, the author offered it as a conjecture, that the metals of the alkalies and earths might exist in the interior of the globe; and on being exposed to the action of air and water, give rise to volcanic fires, and to the production of lavas, by the slow cooling of which basaltic and other crystalline rocks might subsequently be formed. Vesuvius, from local circumstances, presents peculiar advantages for investigating the truth of this hypothesis; and of these the author availed himself during his residence at Naples, in the months of December, 1819, and of January and February, 1820. A small eruption had taken place a few days before he visited the mountain, and a stream of lava was then flowing with considerable activity from an aperture in the mountain a little below the crater, which was throwing up showers of red-hot stones every two or three minutes. On its issuing from the mountain, it was perfectly fluid, and nearly white hot: its surface appeared to be in violent agitation from the bursting of numerous bubbles, which emitted clouds of white smoke. There was no appearance of vivid ignition in the lava when it was raised and poured out by an iron ladle. A portion was thrown into a glass bottle, which was then closed with a ground stopper, and, on examining the air in the bottle some time afterwards, it was found not to have lost any of its oxygen. Nitre thrown upon the surface of the lava did not produce such an increase of ignition as would have attended the presence of combustible matter. The gas disengaged from the lava proved on examination to be common air.

When the white vapours were condensed on a cold tin plate, the deposit was found to consist of very pure common salt; and the vapours themselves contained nine per cent. of oxygen, the rest being azote, without any notable proportion of carbonic acid or sulphureous acid gases; although the fumes of the latter of these gases were exceedingly pungent in the smoke from the crater of the volcano. On another occasion, the author examined the saline incrustations in the rocks near the ancient bocca of Vesuvius, and found them to consist principally of common salt, with some chloride of iron, a little sulphate of soda, and a still smaller quantity of sulphate or muriate of potassa, with a minute portion of oxide of copper. In one instance, in which the crystals had a purplish tint, a trace of muriate of cobalt was detected. From the observations made by the author at different periods, he concludes that the dense white smoke which rose in immense columns from the stream of lava, and which reflected the morning and evening light of the purest tints of red and orange, was produced by the salts which were sublimed with the steam. It presented a striking contrast to the black smoke arising from the crater, which was loaded with earthy particles, and which in the night was highly luminous at the moment of the explosion. The phenomena observed by the author afford a sufficient refutation of all the ancient hypotheses, in which volcanic fires were ascribed to such chemical causes as the combustion of mineral coal, or the action of sulphur upon iron; and are perfectly consistent with the supposition of their depending upon the oxidation of the metals of the earths upon an extensive scale, in immense subterranean cavities, to which water or atmospheric air may occasionally have access. The subterranean thunder heard at great distances under Vesuvius, prior to an eruption, indicates the vast extent of these cavities; and the existence of a subterranean communication between the Solfatarra and Vesuvius, is established by the fact that whenever the latter is in an active state, the former is comparatively tranquil. In confirmation of these views, the author remarks, that almost all the volcanoes of considerable magnitude in the old world, are in the vicinity of the sea; and in those where the sea is more distant, as in the volcanoes of South America, the water may be supplied from great subterranean lakes; for Humboldt states that some of them throw up quantities of fish. The author acknowledges, however, that the hypothesis of the nucleus of the globe being composed of matter liquefied by heat, offers a still more simple solution of the phenomena of volcanic fires.*

PREPARATION OF VEGETABLE EXTRACTS.

By Mr. J. Houlton, F.L.S.

It is well known to professional men, that the juices of almost all plants are more or less injured in their medicinal qualities, by being boiled down and evaporated in the usual way to the consistence of extract.—At Apothecaries' Hall the evaporation is entirely effected by means of steam, so that the heat employed is under complete control; and in Mr. Barry's patent process the evaporation is performed in vacuo.

Mr. Houlton's process is the following:—The plant being bruised, is to be submitted to the action of a press, in order to squeeze out the juice, which is then to be strained through fine linen. The depurated juice is now to be poured to the depth of about one-eighth of an inch into an earthenware plate, or a glass dish, and is to be exposed to a constant current of air, by placing it on the inner sill of a window, and raising the sash about an inch. The constant current of air thus produced, occasions the rapid evaporation of the watery parts, and there remains a soft extract, retaining the colour, odour, and medical properties of the recent plant, with less alteration than by any other method. If the sun shines, a blind should be hung before the window, as vegetable juices are speedily changed by the action of solar light. The consistence given to the extract is entirely optional, but those that are rather hard will keep better than those that are soft.*

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* Phil. Trans.

ON THE INFLUENCE OF THE AIR IN DETERMINING THE CRYSTALLIZATION OF SALINE SOLUTIONS.

By Thomas Graham, Esq. A.M., F.R.S., E.

THE phenomenon referred to has long been known, and popularly exhibited in the case of Glauber's salt, without any adequate explanation. A phial or flask is filled with a boiling saturated solution of sulphate of soda or Glauber's salt, and its mouth immediately stopped by a cork, or a piece of bladder is tied tightly over it, while still hot. The solution, thus protected from the atmosphere, generally cools without crystallizing, although it contains a great excess of salt, and continues entirely liquid for hours and even days. But upon withdrawing the stopper, or puncturing the bladder, and admitting air to the solution, it is immediately resolved into a spongy crystalline mass, with the evolution of much heat. The crystallization was attributed to the pressure of the atmosphere suddenly admitted, till it was shown that the same phenomenon occurred, when air was admitted to a solution already subject to the atmospheric pressure. Recourse was likewise had to the supposed agency of solid particles floating in the air, and brought by means of it into contact with the solution; or it was supposed that the contact of gaseous molecules themselves might determine crystallization, as well as solid particles. But although the phenomenon has been the subject of much speculation among chemists, it is generally allowed that no satisfactory explanation of it has yet been proposed.

Mr. Graham has, however, adduced a number of facts, which appear to warrant the conclusion, that air determines the crystallization of supersaturated saline solutions, by dissolving in the water, and thereby giving a shock to the feeble power by which the excess of salt is held in solution.

* Trans. Soc. Arts.

M. Gay-Lussac, in his paper on crystallization, (*Ann. de Chim.*) had distinctly thrown out the same theory as a conjecture, although the circumstance is not noticed by any systematic chemical writer. But as M. Gay-Lussac brings forward no experimental illustration of the theory, and indeed adduces one experiment as unfavourable to it, the experimental confirmation of the theory is novel, and was certainly required.*

METHOD OF PRESERVING FUNGUSES.

Mr. Cooke, surgeon, (Trinity-square, Tower-hill,) having been very successful in his endeavours to preserve anatomical preparations in salt and water, was requested to try to preserve in the same way a specimen of *Clavaria muscoides*, (Sowerby's English Fungi,) supposing that it might answer for funguses of some kinds.

Mr. Cooke, in a written account, says, "I put it into brine a little below saturation, suspending it by a delicate thread of silk, and closing the bottle by means of glass. Since that time it has remained in the solution, and with the exception of having become a little deeper in colour, it is unchanged. As spirits are not only expensive, but usually deprive plants of all colour, the discovery of a cheap and effectual solution for the preservation of plants is a desideratum."—The specimen was gathered at the latter end of October, 1826, and was presented to the Linnæan Society in May last, with an account of the process.†

ARTIFICIAL ULTRAMARINE.

M. Guimet, of Toulouse, has succeeded in forming this fine colour. It appears that M. Gmelin has also discovered a process for forming it, and which is given as follows in the *Annales de Chimie* for April last. In giving it, it is to be observed that M. Guimet expresses a doubt whether it will yield the colour at a sufficiently cheap rate; but M. Gmelin asserts that it succeeds infallibly:—

Prepare hydrate of silica and hydrate of alumina: the former is obtained by fusing well-powdered quartz with four times its weight of carbonate of potash, dissolving the fused mass in water, and precipitating by muriatic acid; hydrate of alumina is procured by precipitating a solution of alum with ammonia. These two earths are to be carefully washed with distilled water. After this, the quantity of dry earth remaining is to be ascertained, by heating to redness a certain quantity of the moist precipitates. The hydrate of silica which I employed in my experiments, contained in 100 parts 56, and the hydrate of alumina 3·24 parts of anhydrous earth.

Dissolve afterwards, with the assistance of heat, as much of this hydrate of silica as a solution of caustic soda is capable of taking up, and determine the quantity dissolved. Take then for 72 parts of the latter (anhydrous silica) a quantity of hydrate of alumina, which contains 70 of anhydrous alumina; it is to be added to the solution of silica, and the mixture is to be evaporated, with constant stirring, until a moist powder only remains.

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* Trans. Royal Soc. Edin. †Phil. Mag.

This combination of silica, alumina, and soda, is the base of the ultramarine, which is to be coloured by sulphuret of sodium; and this is effected in the following manner:—Put into a Hessian crucible, provided with a good cover, a mixture of two parts of sulphur, and one part of anhydrous carbonate of soda; it is to be gradually heated, until at a moderate red heat the mass is well-fused: this mixture is then to be projected, in very small quantities at a time, into the middle of the fused mass; as soon as the effervescence, occasioned by the vapour of water, ceases, a fresh portion is to be thrown in. Having kept the crucible moderately red-hot for an hour, it is to be taken from the fire and suffered to cool. It now contains ultramarine, mixed with sulphuret in excess, which is to be separated by water. If there be sulphur in excess, it is to be expelled by a moderate heat. If the whole of the ultramarine be not equally coloured, the finer parts may be separated, after having reduced them to a very fine powder, by washing with water.

NEW PYROPHORUS.

M. GAY-LUSSAC, in forming pyrophorus, used calcined lamp-black instead of honey or flour, usually employed. Potash-alum heated with this form of carbon, gave at first carbonic acid and sulphurous gas, and nearly in equal volumes; afterwards carbonic acid was obtained nearly pure, and at last it was mixed with oxide of carbon, and this eventually prevailed. The pyrophorus so formed, burnt readily. M. Gay-Lussac is of opinion that carbon is not necessary to the combustion: he made a mixture of nearly 75 parts of alum, and 3·33 of lamp-black, or 1 atom of the former and 3·5 atoms of the latter; and this mixture, when calcined, at nearly a white heat, gave a reddish-brown product, containing no traces of carbon, but it burnt very readily, and left a grayish-white residuum. Alum is not essential to the preparation. Sulphate of magnesia produces the same effect; sulphuret of potassium alone does not, however, inflame spontaneously in mass; and it occurred to M. Gay-Lussac, that alumina or magnesia acted merely by dividing the sulphuret; that this was the case was proved by substituting charcoal for them, and though the compound obtained, by using 27·3 of sulphate of potash, or 1 atom and 7·5 of lamp-black, or 4 atoms agglutinated and did not inflame; yet, on using double the quantity of lamp-black, the pyrophorus obtained was extremely pulverulent, and was astonishingly inflammable, so much so as to be almost dangerous.

This pyrophorus yields no sulphurous acid during combustion; when put into water, it gives no hydrogen, showing that there is no uncombined potassium; and when the solution is treated with an acid, sulphuretted hydrogen is evolved, and sulphur precipitated. Unlike common pyrophorus, it does not require moist air for its combustion: the charcoal does not appear to be in a state of combination, for the aqueous solution of the pyrophorus is not distinguishable from that of sulphuret of potassium, made without charcoal; and this latter substance is so readily deposited in the vessel, as not to indicate that state of minute division which is characteristic of previous combination.

The new pyrophorus, compared with the common, appears to owe its greater inflammability to several causes; to its more minutely divided state, the absence of inactive earthy matter, and also to the smaller proportion of sulphur. Sulphate of soda, used in equivalent proportion, produces nearly the same effect as sulphate of potash; but sulphate of barytes did not at all answer. M. Gay-Lussac is of opinion that the action of potassium depends essentially upon the great combustibility of sulphuret of potassium, and its action upon water and air; alumina and magnesia appear only to divide the combustible matter; but charcoal being itself combustible, is not passive in the phenomena; the combustion having once commenced, it supports it. A very high temperature did not appear to alter the inflammability of the pyrophorus, provided that, during the cooling, the air was carefully excluded.—*Ann. de Chim.*

Note.—Although we are by no means disposed to undervalue the facts contained in the above statement, yet it will appear from the following quotation from Dr. Thomson's System of Chemistry, vol. ii. p. 541, that one of the principal of them does not possess all the novelty which the author appears to suppose to belong to it:—"Scheele proved that alum deprived of potash is incapable of forming pyrophorus, and that sulphate of potash may be substituted for alum."*

LIGHTNING CONDUCTORS FOR SHIPS.

On Feb. 21 and 28, was read at the Royal Society, an account of the accident to the packet-ship, the New York, from lightning, by Dr. Trail, and communicated to the Society by Henry Brougham, Esq., M.P., F.R.S.:—

The ship which met with the accident of which the effects are the subject of this communication, was the American packet, the New York, of 526 tons, commanded by Captain Bennet. She sailed from New York for Liverpool on the 16th of last April; and on the morning of the 19th was struck by lightning, which shattered the main royal mast, and gliding down the iron chain main-top-sail tie, burst the iron bands on the main-mast head. It was thence conducted by the iron main-top-sail sheets to the iron work of the pumps. It then entered between decks, demolishing the bulk-heads that formed the store-room, in its way to a small leaden cistern; whence it was conducted, by a leaden pipe, through the starboard side of the ship, where it started three five-inch planks, ten feet in length, at the lower part of the bends. Many other parts of the ship, not in the direct line of its passage, were also shattered, apparently from the effects of a lateral explosion; several doors and partitions were thrown down, a large mirror in the cabin was shivered into small fragments, and a piano-forte was thrown down, its top blown off and broken in pieces. The loudness of the explosion was appalling, and spread universal consternation. A sulphureous smoke, which had issued with a bluish flame from the hatches, filled the cabins; and at first inspired alarm, lest the cargo in the hold, consisting chiefly of cotton and turpentine, had taken fire; but on clearing the main hatch, it was soon ascertained that no danger from fire existed. The ship, however, had sprung a leak, which made four inches of water every hour, but which, on washing the pumps, was found to be under command, and would not prevent her proceeding on her voyage to England.

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* Phil. Mag.

When the first terror created by the accident had somewhat subsided, it was found that none of the passengers or crew had sustained any injury. The chief mate was sleeping in the berth opposite to the main hatch, near the spot where the lightning entered the store-room, the lock of which was forcibly driven into his cabin; but he was not himself affected by the shock, and a quantity of gunpowder which was kept under his bed was fortunately not ignited by the lightning. An ewer and a basin placed on a stand over a child's bed were thrown down by the explosion, but the child had escaped unhurt. A remarkable effect was, however, produced on an elderly gentleman, who for the last five years had not been able to walk half-a-mile at a time: terrified by the crash, he forgot his debility, and springing from his bed, rushed on deck with singular quickness and agility. He has retained, ever since the event, the power over the muscles of his limbs, derived from this sudden emotion.

The threatening aspect of the heavens, the appearance of numerous water-spouts on the surface of the sea, and other electrical indications, gave rise to apprehensions of further danger, and induced the captain to put up the conductor with which he was provided, but which had not been previously applied. It was made of iron links eighteen inches long, connected by iron rings one inch in diameter; and was furnished at the top with an iron rod, four feet long, and half an inch in diameter, tapering to a fine point. This rod was fixed so as to rise three feet above the main royal mast head; and the chain was made to descend along the back-stay, and below was kept at a distance of ten feet from the starboard bulwarks by a light wooden outrigger, or spar. Its whole length was 145 feet, of which about nine feet of its lower part descended into the sea. The wisdom of adopting this precaution was soon apparent, for in the course of the same morning the ship was struck by a second explosion, which is stated by the unanimous testimony of all on board to have far exceeded in violence the first. It melted a great part of the conductor, producing a vivid combustion of many of the links, which burned like so many tapers; and descending into the sea, darted off to a considerable distance along the surface of the waves. The resistance to its passage was so great as to cause the ship to recoil with a sudden and violent shock, so as to throw down several of the crew. The melted iron of the conductor fell in large drops on the deck, which, although already strewed with hailstones that had previously fallen, intermixed with rain, was set fire to in many places by the ignited metal. No damage, however, was done to the masts or rigging, nor the least injury to any of the crew, with the exception of a carpenter, who being at work with an iron auger in his hand, received a smart shock through the wrists, which occasioned a livid tumour which was still visible six weeks after the accident.

Soon after the arrival of the vessel in Liverpool, she was docked in order to ascertain what damage she had sustained. Some of her planks were found to have started, but her timbers were uninjured. Every instrument made of steel,—such as the carpenter's tools, and the knives and forks, and also those made of soft iron, even to the very nails in every part of the ship,—had been rendered permanently magnetic. All the watches and chronometers were either stopped or rendered useless, by the magnetism imparted to the balance-wheels and other parts of their works that were made of steel. Contrary to what usually happens from shocks of artificial electricity, the lightning had given a strong northern polarity to the upper part of the conductor. Many parts of the iron-work indeed had acquired the magnetism corresponding to their position with respect to the magnetic direction; but in others no relation of this kind could be traced. Great changes were produced on the magnetism of the compass needles, in many of which were formed several sets of poles, and their indications could therefore no longer be relied on.

The circumstances attending the accident which is the subject of this paper, are considered by the author as strongly confirming the value of conductors to ships in obviating the destructive effects of lightning. From the inquiries he has made, he is led to the belief that injuries from lightning at sea are much more frequent than is generally imagined. One source of increased danger of late years is to be found in the greater proportion of metal, and particularly of iron, which is employed in the rigging; more especially as the metallic masses are there nearly insulated, or connected only by very imperfect conductors. In the instance before us, it is in the highest degree probable, that if the New York had been without the protection of the conductor, she must inevitably have been destroyed by the second tremendous explosion, which, thus guarded, she sustained without the slightest injury. The author remarks that copper is a better material for such a conductor than iron, from its being less liable either to fusion or corrosion; and also that a rod is, from its continuity, a better form of conductor than a chain. In the case of ships, however, the greater convenience of a chain, arising from its flexibility, will generally insure it the preference. The author recommends, that, instead of carrying the conductor through the decks to the keel, as suggested by Mr. Harris, the lower end of the chain should be kept at a distance from the sides of the ship, by means of a light outrigger, or spar, as was done in the New York.*

NEW BORATE OF SODA.

M. Payen lately presented to the Society of Pharmacy a new borate of soda, which will advantageously be substituted for calcined borax. It crystallizes in regular octahedrons, is harder than common borax, and is almost as sonorous as cast iron: its fracture is vitreous, and rather undulated. When immersed in water, the crystals become opaque, and retain their opacity in dry air.

This borate differs but little from common borax, except in containing less water of crystallization. It is more convenient for soldering copper than common borax, because it does not swell so much.†

LIGHT ON SENSITIVE PLANTS.

Light exercises a very remarkable influence upon the irritability of the sensitive plant. Thus if a sensitive plant be placed in complete darkness, by carrying it within an opaque vessel, it will entirely lose its irritability, and that in a variable time, according to a certain state of depression or elevation of the surrounding temperature.‡

ELECTRICITY OF GASES AND THE ATMOSPHERE.

M. Pouillet concludes from numerous experiments:—1st, That gases give out electricity, when they combine together, or when they unite with solid or fluid bodies; and in these combinations, oxygen always gives out positive electricity, and the combustible body, whatever it may be, gives out negative electricity; and reciprocally, when a compound is decomposed, each of the elements then requiring the electricity which it had given out, is in the opposite state of electricity. This reciprocity shows in what consists the difference of the nascent state of a body from its ultimate condition.

2ndly. The action of vegetables upon the oxygen of the air is one of the most permanent and powerful causes of atmospheric electricity; and when it is considered on one hand that a gramme (about 15·5 grains) of charcoal, in becoming carbonic acid, gives out sufficient electricity to charge a Leyden jar; and on the other hand, that the charcoal which is contained in vegetables does not give out less electricity than charcoal which burns freely, one may conclude, says M. Pouillet, as my direct experiments tend to prove, that over a surface of vegetation 100 metres square, more electricity is produced in a day, than is necessary to charge the strongest electrical battery.*

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* Phil. Trans. † Journal de Pharmacie. ‡ Mirror.

NEW PHENOMENA OF VAPOUR OBSERVED BY CLEMENT DESORMES.

This philosopher communicated, on the 4th of December, 1827, to the Royal Academy of Sciences, some singular results relative to steam. "When compressed in a boiler, and issuing in a violent and hissing jet, through an orifice made in a pretty large plate, if a flat disk of metal be presented to it, at a little distance from the orifice, the disk is strongly repelled; but if it be brought near and placed against the plate, as if to close the orifice, although the steam issues on all sides like artificial fire-works, and presses against the disk more than before, not only is the disk not driven away, but it adheres to the plate even when the jet is directed downwards. It remains suspended in opposition to its gravity, and can be detached only by force. The same result takes place in an experiment with the wind which issues from the large bellows of a furnace."†

CHANGE OF CRYSTALLINE STATE IN A SOLID BODY.

It was in the sulphate of magnesia that I first remarked the change, of form, of a solid body, or, more accurately, the change in the position of its atoms, without the assumption of the liquid state. If this salt or the sulphate of zinc be slowly heated in alcohol, and gradually raised to ebullition, the crystals will lose their transparency by degrees, and when broken, they will be found to be formed of a great number of new crystals, entirely different in their form to those of the salt employed.—Mitscherlich, *Annales de Chimie.*

This is a case of internal motion to be added to those already known of basalt, arsenious acid, barley-sugar, sulphur, &c.‡

BARON HUMBOLDT ON THE PHENOMENA OF VOLCANOES.

The question has often been asked, What is it that burns in volcanoes? What is it that produces the heat in them by which the earth and metals are melted and intermingled? The new chemistry replies: What burns is the earth, the metals, and even the alkalies, that is to say, the metaloids of these substances. The already oxidized envelope of the earth separates the atmosphere, rich in oxygen, from, the unoxidized inflammable principles which reside in the interior of our planet. Observations made in all countries, in mines, and caves, and which, in concert

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[*] Annals de Chimie. [†] Philosoph. Mag. [‡] Brande's Journ.

with M. Arago, I have detailed in a memoir on the subject, prove that, even at a small depth, the earth's heat is much superior to the mean temperature of the surrounding atmosphere. A fact so remarkable, and elicited from observations made in almost every part of the globe, connects itself with what we learn from the phenomena of volcanoes. La Place has even attempted to determine the depth at which the earth may be considered as a melted mass. Whatever doubts may be entertained, notwithstanding the respect due to so great a name, as to the numerical accuracy of such a calculation, it is not the less probable, that all volcanic phenomena arise from a single cause, which is the communication, constant or interrupted, that exists between the interior of our planet and the external atmosphere. Elastic vapours, by their pressure, raise through deep crevices the substances which are in a state of fusion, and which are oxidized. Volcanoes are, so to speak, intermittent springs of earthy matters. The fluid mixtures of metals, alkalies and earths, which condense into currents of lava, flow gently and slowly, when, on being raised up, they once find an issue. It was in this manner that, according to Plato's *Phædos*, the ancients represented all the torrents of fire as emanations of the Pyriphlegeton.

To these considerations may I be permitted to add another of a bolder character. It is perhaps in the internal heat of the earth, a heat which is indicated by experiments made with the thermometer, and the phenomena of volcanoes, that the cause of one of the most astonishing phenomena which the knowledge of petrifactions presents to us resides. Tropical forms of animals, arborescent ferns, palms, and bamboos, occur imbedded in the frozen regions of the north. The primitive world every where discloses to us a distribution of organic forms, which is in opposition to the presently existing state of climates. To solve so important a problem, recourse has been had to a great number of hypotheses, such as the approach of a comet, the change of obliquity of the ecliptic, the increase of intensity of the solar heat. None of these hypotheses has been able to satisfy at the same time the astronomer, the natural philosopher and the geologist. As to my own opinion on the subject, I leave the earth's axis in its position, I admit no change in the radiation of the solar disk, a change by which a celebrated astronomer thought he could explain the good and bad harvests of our fields; but I imagine that in each planet, and independently of its relations to a central body, and independently of its astronomical position, there exist numerous causes of developement of heat, whether by the chemical processes of oxidation, or by the precipitation and changes of capacity of bodies, or by the augmentation of the electro-magnetic intensity, or the communication between the internal and external parts of the globe.*

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* Jameson's Journal.

COLOGNE YELLOW, A SUBSTITUTE FOR THE CHROMATE OF LEAD.

THE discovery of the chromic acid is one of the finest which chemistry has made during the last thirty years; but the dearness of this product has for a long time limited its use; and, notwithstanding the various manufactories established for its fabrication, it is still of too high a price to be employed in the production of those paints or colours which should unite a facility of laying them on the work with a solidity of colour.

This new product possesses these two desirable qualities; it is sold in Paris under the name of *poudre de Cologne;* after many essays, it is found that 10 grammes of this substance contain 1,95 of sulphate of lead, 6 of sulphate of lime (gypsum,) and 2,5 of chromate of lead, composed of 1,63 of lead, and 587 of the chromic acid. By the analysis, it could not be ascertained whether this powder was formed by a simple mixture of its component parts, or whether it was a true combination.

After examining this powder with considerable attention, the idea occurred to the author of this article, that the sulphate of lime which it contained in such large proportion, was only impregnated with a small quantity of chromate of lead. In making an experiment, he effected the decomposition of the sulphate of lime and chromate of lead, by a solution of sulphate of soda (Glauber's salt,) and the neutral acetate of lead, and a precipitate was instantly formed of a very fine colour, and which only differed from the yellow powder of Cologne by its lesser density. This difference in the weight induced the author to mix the sulphate of lime, in the state of a very fine powder, with a solution of chromate of potash, and precipitate it by means of the neutral acetate of lead, and he thus formed an exactly similar product. The powder obtained by this last process differed in no respect from the Cologne yellow.*

PROPOSED IMPROVEMENT OF THE AIR-PUMP.

THERE is reason to think that something like Mr. Watt's principle of the double stroke in the steam-engine, might be advantageously applied to the air-pump. By this means one barrel could do the work of two, which would both lessen the cost and greatly diminish friction. At first it might be supposed that, by this arrangement, the management of the valves would be rendered rather complicated; but, instead of that, they would admit of considerable simplification, by adopting another principle often employed about steam-engines, under the name of the coffer-slide valve. Suppose the barrel to be provided with a solid piston, moved by a rod passing through an air-tight collar. Let there be two holes in the side of the barrel, one adjoining each end; and let these be covered by a sliding bar furnished with four holes on its side, two being near to each end, and the whole so arranged, that two of them at a time, but taken in an alternate order, can by a slight motion of the bar, be brought opposite the holes of the barrel, while the other two are not, and *vice versa*. Suppose two of the four holes, say the middle ones, to be the ends of two tubes which unite in one slender winding and slightly flexible tube, communicating with the receiver; and let the other two be merely perforations, which may have their exterior ends either quite open, or, to prevent any return of air into the barrel, they might be covered with slips of bladder or oiled silk. If, then, the bar be moved up and down alternately about the third of an inch, so as to have two of its holes, one of each sort remaining over these in the barrel, while the piston moves in the one direction, and the other two remaining over those of the barrel, while the piston returns in the opposite direction, it is evident that we shall have, in this simple arrangement, all the security of four metallic valves, and a single barrel and piston doing the work of two. The obvious design of the long flexible tube is to permit the compound valve to move without any other joints. It might, indeed, remain fixed, while the barrel itself moved a little, but this would have its inconveniences. I intend having an air-pump made on these principles, and then to give a more particular description of its several parts.*

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* M. Boutron-Charland.—Journ. de Pharmacie.

DETECTION OF BLOOD.

A CONTROVERSY has recently taken place in Paris, relative to the efficacy of certain chemical means of ascertaining whether dried spots or stains of matter suspected to be blood, are or were blood, or not. M. Orfila gives various chemical characters of blood under such circumstances, which he thinks sufficient to enable an accurate discrimination. This opinion is opposed by M. Raspail, who states, that all the indications supposed to belong to true blood, may be obtained from linen rags, dipped, not into blood, but into a mixture of white of egg and infusion of madder, and that, therefore, the indications are injurious rather than useful.†

ELECTRIC SHOCK AT SEA

ON Friday, September 7, about half-past one P.M., the Dart steam vessel, then passing through the water at about thirteen miles an hour, and in the five fathom channel, opposite Whitstable, running for Margate, was overtaken by a stiff squall from the west, with heavy rain. Several claps of thunder had been previously heard. After the squall had lasted a few minutes, and curled up the sea in a curious manner in patches, the denser part of the cloud seemed to settle down towards the vessel, whilst noticing its proximity, first a very faint illuminating light waved over the starboard paddle-box, and immediately an appalling flash and burst took place, about nine or ten feet from the deck, directly between, although a little higher than, the paddle-boxes. The noise of the explosion somewhat resembled the discharge of a large howitzer, when close to the hearer, having in addition a hissing noise, like a Congreve-rocket, yet of shorter duration. The form and appearance of the fire was that of a flash from a twelve or fourteen inch mortar, seen at night, accompanied by some thirty or forty red sparks, like those from red hot iron when struck on the anvil. The flash, sparks, and hissing, seemed to go over the larboard paddle-box towards the sea. One of the seamen on the look out near the head of the vessel, was thrown forwards, bent, as he expressed it, to the deck. Two others near him received violent blows on the legs, all which I have no doubt arose from the sudden expansion of the air; indeed the expansion sensibly shook the whole vessel, and the passengers on the aft part of the deck felt the heat in their faces from the flash. Luckily the rain had driven the passengers from the fore-deck either into the cabins or under the awning of the after-deck.*

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* H. Meikle.—Philosoph. Journ. † Mirror.

EFFECTS OF HEAT UPON SULPHUR.

According to M. Dumas, fuseds ulphur begins to crystallize between 226° and 228°; between 230° and 284° it is as liquid as a clear varnish, and of an amber colour; at about 320° it begins to thicken, and acquire a red colour; on increasing the heat, it becomes so thick that it will not pour. This effect is most marked between 428° and 572° the colour is then a red brown: from 572° to the boiling point it becomes thinner, but never so fluid as at 248°; the deep red brown colour continues till it boils. When the most fluid sulphur is suddenly cooled, it becomes brittle; but the thickened sulphur similarly treated, remains soft, and more soft as the temperature has been higher. Thus, at 230° the sulphur was very liquid and yellow; and cooled suddenly by immersion in water, it became yellow and very friable; at 374° it was thick, and of an orange colour; but by cooling became at first soft and transparent, but soon friable and of the ordinary appearance: at 428° it was red and viscid; and when cooled soft, transparent, and of an amber colour; at the boiling it was of a deep, brown, red colour; and when cooled very soft, transparent, and of a red brown colour. It is not necessary, as is sometimes stated, to heat the sulphur a long time to produce this effect; all depends upon temperature. The only precaution necessary is, to have abundance of water, and divide the sulphur into small drops or portions, that the cooling may be rapid. If it be poured in a mass, the interior cools slowly, and acquires the ordinary hard state. When the experiment is well made at 446°, the sulphur may be drawn into threads as fine as a hair, and many feet in length.*

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* Maidstone Journal.

CHEMICAL EXAMINATION ON ANCIENT INSTRUMENTS.

M. VAUQUELIN has analyzed a poignard blade, formed entirely of copper; a mirror found to consist of 85 parts of copper, 14 tin, and 1 of iron per cent; and a blue colour found in a tomb, gave by analysis, silica 70, lime 9, oxide of copper 15, oxide of iron 1, soda and potash 4. A blue colour similar to this both in tint and composition, was found in the bottom of a furnace in which copper had been fused at Romilly.†

EXAMINATION OF COPPER.

(*By R. Phillips, Esq.*)

SOME samples of copper which I examined some time since, contained a small portion of silver, without any other impurity which I could detect; lately, some other samples have been put into my hands, in order to determine the cause of their being complained of. The copper was dissolved in dilute nitric acid, used in excess; it contained no lead, and upon the addition of muriatic acid to a very dilute solution, slight precipitation took place, which I at first imagined was occasioned, as in the former case, by the presence of silver. I happened, however, to remember a fact mentioned in conversation some years since, and which I have never met with in any chemical work,—That a solution of bismuth so diluted or so acid that water would occasion no precipitation in it, is decomposed by the addition of common salt or muriatic acid; and this I found to be the case in the present instance: the precipitate was small in quantity, not amounting to one per cent for the copper employed, and it differed from chloride of silver in very readily passing through filtering paper. I found it necessary, in order to determine its quantity, to supersaturate with ammonia, by which the oxide of copper was dissolved, and the oxide of bismuth precipitated.‡

ON EFFLORESCENCE.

THE following observations are by M. Gay Lussac. Many salts when exposed to the air, are well known to effloresce; that is, they fall to powder and lose their water of crystallization; and it is generally supposed that salts after efflorescence are perfectly anhydrous (free from water.) Having been long convinced that this opinion is not correct. I have made some experiments upon the principal salts which are efflorescent in a high degree. Crystallized sulphate of soda, exposed to the air, even when it is not very dry, readily loses all its water of crystallization. Phosphate of soda becomes readily opaque without losing its form. After three months' exposure to the air, it contained on the 18th of July, 7·4 of the 12 proportions of water, which it contains in its usual state. Reduced to powder, and thinly spread upon paper, it contained on the 26th of July 5·65 proportions of water;—again exposed to the air during a hot and dry period, it contained on the 31st of July only 5·65 proportions;—afterwards exposed till the 21st of October, the weather having become colder and more damp, it was found to contain 7·2 proportions of water; some phosphate which had been calcined, absorbed in five days' exposure to the air, nearly half a proportion of water.

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* Ann. de Chim. † Bull. Univ. ‡ Phil. Mag.

Carbonate of soda behaves on exposure very much as the phosphate: it becomes opaque, loses much water without altering its form; but I have never found it anhydrous after exposure.

It results from these observations, that some salts completely lose their water of crystallization by efflorescence; but that others retain variable quantities, according to the hygrometric state of the air. I do not assert, however, that the water may not remain in definite proportions; it merely appears that in the phosphate and carbonate of soda, which retains a proportion of water of a certain number,—the seventh for example,—differs but little from that which unites the proportion, immediately above or below.*

TEST OF THE PRESENCE OF AMMONIA.

M. Plessin having occasion to ascertain whether the action of a salifiable base upon a body containing azote was simply that of evolving ammonia previously existing, or that of forming ammonia by combination, endeavoured to find a base, which would effect the former object but not the latter. Potash, lime, magnesia, and many other bodies, do both; but the hydrated oxide of lead answered the purpose very well. It gives no indication of ammonia when put into contact with azotated substances, not containing that alkali; even urea is not effected by it; but being put in contact with an ammoniacal salt, ammonia was instantly evolved, and rendered evident by the visible fumes which arose upon the approximation of a little acetic acid.†

ARTIFICIAL COLD—CREAM FREEZING APPARATUS.

This is an ingenious application of chemistry to an important branch of household convenience, viz., the artificial production of cold. The discovery was made by Richard Walker, Esq., of Oxford, and first published in the Philosophical Transactions for the year 1787; but the present application of its principles is of very recent date. Mr. Walker, in an interesting paper in the *Philosophical Magazine*, explains his claim to the discovery, and thus illustrates its application.

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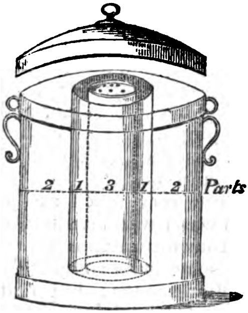
* Ann. de Chim. † Ibid.



The apparatus (*represented in the Engraving*,) consists only of two parts; viz. the vessel for containing the freezing mixture; and a cover, to which is attached, in the same piece, a concentric annular cavity or chamber, in which the prepared cream is to be frozen; this cavity, forming a circle within the vessel itself, is open at the top, as represented, and of course closed at the bottom, and reaching very nearly to the bottom of the vessel: this secondary part fits close over the vessel containing the freezing mixture. The proportions of the apparatus when together are thus:—The outer space in width, two parts all round; the middle space, or that which contains the cream, one part all round; and the inner space three parts in width,—this serving as a general scale of proportions for an apparatus of any size. The proportions for an efficient apparatus, as my own, may be; for the first space ten-eighths of an inch (one inch and one-fourth;) for the second, five-eighths of an inch; and for the third space, fifteen-eighths, or rather two inches, making the width of the apparatus itself somewhat above five inches and a half; its height being equal to its width, a projecting rim at the bottom likewise to insulate it from the table. It will be perceived that in the figure there are seven very small holes or apertures in the central part of this cover (one in the centre and six round at due distances,) just sufficient for the escape of the air, to admit of the ascent of the freezing mixture in the middle part of the vessel. The apparatus is somewhat elevated at the top, or slightly convex, and the part in which the apertures are placed guarded by a shallow rim to prevent an accidental running-over of the mixture into the part containing the cream. The apparatus should be furnished (as expressed in the figure) with an outer cover. Previously to use, it will be proper to ascertain the quantity of liquid the apparatus will contain when together, and mark its height; likewise the proportion of the ingredients for furnishing a given quantity in measure should be known. Thus, if the three salts are used (which I would recommend to a private individual, always doing so myself, although these cannot be recovered for future use, but being more efficacious than the two only) for each pint, small or old measure, will be required of sal ammoniac and nitre (each equal parts by weight reduced together into fine powder) six ounces, and of Glauber's salt, in clear crystals and dry, four ounces and a half, freely reduced to fine powder, or kept from the access of air, and in a separate parcel from the former; and water ten ounces, or enough to make up one pint in measure when added to the former ingredients:—of course, the whole must be well stirred together, and expeditiously, before introducing that part of the apparatus which contains the article to be frozen, and occasionally afterwards, till the object is completed, avoiding as much as possible any accidental accession of heat. A freezing mixture composed of sal ammoniac and nitre with water, all at the temperature of 50°, to which temperature, or nearly so, they may all be reduced by water from a pump by drawing off a sufficient quantity first, will from 50° produce a cold of 22° below the freezing point, and with the addition of Glauber's salt to 28°. The confectioners find a degree of cold at 12° or 15° below the freezing point sufficient for their purpose; but it must be recollected that the cold produced by salts dissolved in water is not so durable as with ice and salt; the duration of the refrigerating power in the above mixtures will of course be in proportion to the quantity and thickness of the apparatus. In the way the confectioner managed, the mixture in the apparatus retained its freezing property till the morning: my usual way is, in extreme hot weather, to place the vessel containing the powdered salts in the coldest water drawn from the pump previously; but in the ordinary way it will suffice to add the cold water without the above precaution: it may be advisable to be provided with a second quantity of the ingredients to preserve the cold by a renewal of the mixture. The drawing is taken from an apparatus of my own, it is made of tin, for want of a fitter material, and painted outside of a grass-green colour. A confectioner (at Oxford) laid in a stock of a hundred weight of each of the articles, viz. sal ammoniac and nitre; the former at the rate of one shilling per pound, and the nitre at four-pence —which of course when mixed, was at the moderate price of only eightpence per pound. Glauber's salts may be procured in the large way at the rate of about two-pence per pound, and by the single pound at four-pence. The apparatus abovementioned may be only half or three parts filled for use; care must be taken in every instance that the surface of the subject to be acted upon be rather below the surface of the freezing mixture.

In the *Philosophical Magazine,* there are two other apparatus described—one for freezing water on the smallest scale, in the hotest weather,—the other, in one piece, for cooling wine; but the *Cream Freezing* apparatus is the most important of Mr. Walker's ingenious inventions.

CONDUCTING POWER OF METALS FOR ELECTRICITY.

The following are the results of M. Pouellet's researches on this subject, and are highly interesting, especially as regards the effect of alloys on the metals; for even small quantities of foreign substances exert great influence on the conducting power. The purity of the silver is expressed by the proportion of pure silver per cent. present in the alloy; the column of figures represents the conducting power:—

Silver of 98.6	860	Red copper	224
Red copper	738	Brass	194
Silver of 94.8	656	Iron	121
Fine gold	623	Gold of 18 car. fine	109
Silver of 80	569	Platina	100

M. Pouellet believes that the conductibility is truly in the inverse ratio of the length of the wires, provided that the resistance opposed to the electricity in traversing the fluid in the cells of the pile and the different conductors which carry it to the experimental wire could be taken into account.*

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* Bull. Univ.

CONDUCTING POWER OF DIFFERENT FLUIDS FOR VOLTAIC ELECTRICITY.

The following table is drawn up from the experiments of M. Foerstemann. The first column of figures indicates the specific gravity; the second, the quantity of electricity conducted by the different substances in equal times; and the third, the time required for the conducting of equal quantities of electricity.

Muriatic acid	1.126	2.464	0.410
Acetic acid	1.024	2.398	0.423
Nitric acid	1.236	2.283	0.438
Ammonia	0.936	2.177	0.459
Sol. muriate of ammonia	1.064	1.972	0.509
Sulphuric acid	1.848	1.737	0.575
Sol. potash	1.172	1.709	0.585
Sol. common salt	1.166	1.672	0.598
Sol. acetate of lead	1.152	1.560	0.632
Distilled water	1.000	1.000	1.000*

ALTERATION OF BRASS WIRE IN THE AIR.

M. Cagniard de la Tour stated to the Academy of Sciences, that when long brass wires were stretched for some days in the open air, especially in wet weather, they became so brittle as to break with great facility when bent to a moderate acute angle.

CHAMELEON MINERAL FOR MARKING LINEN.

In many large establishments linen requires to be marked quickly, permanently, and economically. The following is a process recommended in France:—Prepare a chameleon mineral, by heating a mixture of 1 part oxide of manganese of commerce, and 2 parts of nitre, or common potash, to redness; the green substance obtained is to be preserved in dry bottles, as it changes in the air. When required for use, it is to be powdered, and mixed up with its weight of pipe-clay, and then water added, to make a very thin paste. It is this mixture which is to be applied to the linen, either by a brush, or a stamp, or in the manner of stencilling, or even by a pen, if it be made thin, and used quickly. The green paste quickly changes to brown on the linen, and the latter being washed about half an hour afterwards, the loose particles and the potash are removed, and the marks left of a deep brown colour. This writing perfectly resists the action of alkaline lixivia, even though strong; it also resists soap and weak acids: hence the process may be useful to calico-printers. The operation depends upon the reduction of the manganesic acid in the chameleon mineral to the state of oxide by any organized matter.

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* Bull. Univ.

The same circumstance renders it necessary to keep the substance from the contact of such bodies, and it is in its best state when recently prepared.*

PREPARATION OF TANNIN.

According to M. Berzelius, tannin is not in the very impure state, in an infusion of galls, generally supposed. He prepares it pure in two ways, either by the action of sulphuric acid, or of carbonate of potash. *First method.* A hot infusion of gall-nuts is to be filtered through a cloth, a very small quantity of weak sulphuric acid added, and the whole well mixed; the coagulum formed is to be separated, and the liquid filtered. Sulphuric acid, diluted with half its weight of water, is to be added in small quantities with agitation; the precipitate, after an hour's rest, acquires a half-fluid glutinous state; then the fluid is to be decanted, and carefully mixed with concentrated sulphuric acid, as long as any precipitate is formed. It is a compound of sulphuric acid and tannin, yellowish-white, and insoluble in a weak acid. Being put on a filter, it is to be washed with diluted sulphuric acid, pressed between bibulous paper, dissolved in pure water, and carbonate of lead in fine powder added to the fluid, until the free sulphuric acid is neutralized; ebullition for a short time also removes the acid combined with the tannin; perfect saturation is indicated by the deep yellow colour taken by the solution. The filtered fluid is to be evaporated carefully to dryness in an air-pump if possible; the brown extract obtained pulverized, and digested in either, at a temperature of 86° Fahr. The ethereal solution evaporated yields a pale, yellow, transparent substance, which is pure tannin. It suffers no change in the air.

Second method. A concentrated solution of carbonate of potash is to be added to a filtered infusion of galls, only as long as a white precipitate is formed. The precipitate is to be washed on a filter with ice-cold water, and then dissolved in weak acetic acid. By filtration a brown matter is separated; the clear fluid is to be precipitated by acetate of lead; the compound of tannin and oxide of lead washed, and then decomposed by sulphuretted hydrogen. The filtered liquid is then colourless, and being evaporated under the air-pump receiver, gives transparent yellowish hard scales, which, treated with either as before, yield pure tannin.

Pure tannin is colourless, but sometimes becomes coloured by alteration in the air; it is not deliquescent, is easily pulverised, and dissolves readily in water. By distillation it yields no ammonia, but a yellow oil and a liquid, which, on cooling, deposit crystals different from those of gallic acid; they have a hot taste, and colour or precipitate salts of iron of a yellowish or grayish green.

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* Annales de l'Industrie.

The combinations of tannin with acids, when exactly saturated, have no sourness, but a pure astringent taste. When pure, they are usually very soluble in water, and precipitated only by a great excess of acid. With salifiable bases, tannin forms very curious compounds. The neutral compound, with potash or ammonia, is little soluble in cold water, more so in hot, separating from the latter, as the temperature diminishes, in the form of a white powder, which, put in the filter, pressed and dried, looks like an earthy salt, and remains unchanged in the air. When moist it forms extract by means of the air. The combination with soda is much more soluble.

M. Berzelius then describes the tannin obtained from various other sources, as catechu, gum kino, cinchona, with their processes, and states that these kinds of tannin differ very much from each other.*

CITRIC ACID FROM GOOSEBERRIES.

Mr. Tilloy has obtained citric acid from this fruit, at an expense less than half the usual price of the acid in France. The Gooseberries are to be bruised and fermented: the alcohol formed, distilled off, and the residue pressed to extract the liquid. The latter is to be heated, and carbonate of lime added as long as effervescence is occasioned; the citrate of lime is then to be collected, drained repeatedly, washed, and then pressed; it is still coloured and mixed with malate of lime; it is to be mixed with water until of the consistence of thin syrup, heated, decomposed by sulphuric acid, and the whole diluted with twice its weight of water. The fluid separated from the precipitate is to be again treated with carbonate of lime; and now the precipitate, when collected on a filter, is to be well washed, pressed, and a third time decomposed by sulphuric acid. The clear liquor now obtained is to be boiled with animal charcoal, filtered, and evaporated. When sufficiently concentrated, it must be allowed to deposit, and the fluid, when poured off, be put into stoves heated to between 68° and 77° Fahr. Crude crystals of the citric acid will be thus obtained; they are to be drained slightly, washed, and recrystallized.†

NEW SOLAR PHOSPHORI.

(*By M. Osam.*)

The solar phosphori, prepared in the following manner, are described as being far more powerful in their effects than those previously known:—

1. Oyster-shells are to be calcined; the whitest and most porous are to be selected, to be cleansed from all impurities, and then packed into a crucible in the following manner. The bottom

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* Ann. de Chim.

† Journ. de Phar.

of the crucible is to be covered with a thin layer of finely pulverized sulphuret of antimony, then an oyster-shell is to be put in, this is to be covered with more sulphuret, after which, a second shell is to be packed in, and so on, until the crucible is full. The powdered sulphuret should be spread uniformly by means of a fine sieve, and each layer of it should be about half an inch in thickness. The crucible being closed, is then to be heated red hot for an hour. When cold, the upper and lower shells, if spotted, are to be rejected, and the rest preserved. When exposed to sun light, and then taken into a dark place, it shines brightly at every part, with a greenish-white light. A red heat applied for a long time causes the light to be white.

2. If the powder used be red sulphuret of arsenic (realgar,) instead of antimony, the light of the phosphorus produced, after exposure to the sun's rays, is blue, like that of a sulphur flame. The phosphorescence is not so universal as with the preceding, but takes place only upon the white parts. Points occur here and there producing light of a very fine, reddish, purple colour. If heated highly for a long time, the light produced by phosphorescence is then white.

3. Arseniate of baryta and gum, made into a paste, and heated to redness for half an hour, produces a yellowish-grey substance, which by phosphorescence, yields a red light; if heated more than half an hour, the light is yellow; if for a long time, the light is white.

Weaker phosphori are produced by using the following substances with the oyster-shells: mosaic gold, light bluish; cinnaber, light yellow; white arsenic, light yellowish-blue; blend and sulphur, light bluish. All the phosphori may be preserved in jars closed by bladder; even in the air they do not change rapidly: three weeks' exposure did not diminish their power. When the lime falls to powder, their effects are diminished. Those prepared with antimony and realgar lose in the intensity of the colour when long exposed to light, so that they should be preserved in blackened bottles.

Cold favours the absorption of light; heat favours the dispersion; boiling water destroys the phosphorescence. Exposed to solar light for a minute, and then taken into a dark place, some Bolognian phosphorus shone for four minutes; the third of those above, for 34 minutes; the first (with antimony) for 149 minutes; and at this period that prepared with realgar shone as brightly as it did one hour before. A red heat applied for several hours destroyed the power of the realgar preparation, very much weakened that with antimony, but did not affect that of the arsenic compound.

The light of an electric spark passed one inch above these phosphori makes them luminous. These phosphori shine even in the daylight, but their light then appears white.*

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* Bull. Univ.

RECTIFICATION OF SPIRITS.

A PATENT has been recently obtained for an improved process of rectifying spirits, which deserves to be noticed. The material proposed to be employed is charcoal, which is to be recharred immediately before using, and ground or bruised to a fine powder. This pulverised charcoal is to be introduced into the still in the proportion of about one gallon of the charcoal to four gallons of spirits. The application of fresh charred wood or charcoal to the spirits, in this way, will, it is said, totally destroy the empyreumatic flavour which the spirit may have contracted in the process of distillation. It is further proposed, in order to get rid of the essential oil in spirits, to mix water with it, and then to introduce the fresh charred charcoal in the way described, which will perfectly purify it, and leave the spirit without any unpleasant flavour. Spirits rectified in this way will be found particularly desirable for preparing and mixing with cordials.*

INFUSIBLE CRUCIBLE.

M. DEYOEX has manufactured crucibles surpassing even those from Saxony in their infusibility. MM. Thenard, Lassagne, and Baruel testify to their superiority. Two and a half pounds of pure iron has been fused in one at once, without the crucible suffering any injury. The manufactory is at Mouchy Saint Eloy, department de l'Oise; but the depôt is at Paris, Rue Garanciere.†

FORMATION OF ADIPOCIRE.

DR. HARLAN of Philadelphia relates, that having occasion to macerate a cranium in the summer of 1824, he directed the head of a large fat negro, who had died of acute fever, to be placed in a barrel half filled with water and closely covered over. On examining the process about six weeks afterwards, he was surprised to observe the head floating buoyantly on the surface of the water, lying on one side. The gas disengaged during putrefaction, and detained within the cranium, had probably produced this effect. The upper surface, or that which floated *above* the water, presented a tumid appearance, and on cutting into it, the whole substance down to the bone was found converted into adipocire. That portion of the head and face, on the contrary, immersed in the water was putrid and macerated.

Those bodies, says the doctor, in which this change has occurred in the cemeteries of this city, such at least as have come under my observation, have been interred in a soil of clay with a layer of gravel or sand superimposed; the water percolating

* Monthly Mag.

† Ann. de Chimie.

down to the clay, which confines it in the vicinity of the body, which rests on the water.*

PROPERTIES OF CHARCOAL.

Among the properties of charcoal may be mentioned its power of destroying smell, taste, and colour; and as a proof of its possessing the first quality, if it be but rubbed over putrid meat, the bad smell will be destroyed. If a piece of charcoal be thrown into putrid water, the putrid flavour is destroyed, and the water is rendered comparatively fresh. The sailors are aware of this fact, and when the water at sea is bad, are in the habit of throwing pieces of burnt biscuit in it to rectify it. Again, colour is materially influenced by charcoal, and, in numbers of instances, in a very singular way. There are numerous applications of this property of charcoal to useful purposes in the arts; if you take a dirty black syrup, such as molasses, and filter it through burnt charcoal, the colour will be removed. There are some properties in charcoal which appear to be mechanical rather than any thing else; but for the purpose just mentioned, the charcoal of animal matter appears to be the best. You may learn the influence of charcoal in destroying colour, by filtering a bottle of port wine through it; it will lose a great portion of its colour in the first filtration, and become tawney; and after repeating the process two or three times, you may destroy its colour altogether. It is a very hygrometric substance, and therefore absorbs air and moisture in considerable quantity: it therefore increases in weight, on exposure to air after burning.†

VOLATILIZATION OF ALCOHOL.

According to M. Soemmering, strong alcohol yields a weaker spirit at the commencement of distillation than it does afterwards. With weak alcohol, the weaker it is the more readily is its strength increased by distillation; on the contrary, the more concentrated it is, the more difficult is it to remove the rest of the water. When alcohol of specific gravity 0.796 is distilled, the weakest comes over first, and the product becomes stronger as the operation proceeds.†

INTENSE LIGHT.

It is stated by an eminent German chemist, that hydrate of lime, pulverised, and exposed upon charcoal to a stream of oxygen, through a blow pipe, with an orifice of 0·02 of an inch in diameter, fed by a common lamp, gives the most intense light. He attributes this to a sort of pulverulent atmosphere, which the lime disengages at that temperature. Substances which do not form molecules in a gaseous state cannot produce so vivid an incandescence.*

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* N. American Med. Journ.

† Brande's Lect.—Lancet.

‡ Bull. Univ.

NATURE OF ALOETIC ACID, OR THE BITTER OF ALOES.

M. Liebeg finds this substance to be a combination of carbazotic acid, and a particular substance having many of the properties of resins. The bitter of aloes may be formed in large quantity, by acting upon aloes with nitric acid of the specific gravity of 1.25. The substance obtained forms a purple salt with potash, but little soluble, and precipitating the salts of baryta, lead, and peroxide of iron, of a deep purple colour. When a solution of this salt was precipitated by acetate of lead, the water employed to wash the precipitate had a yellow colour, and deposited small crystals of the same colour. These crystals heated in water with sulphate of potash, gave carbazotate of potash, and from that carbazotic acid was obtained.

When aloes are heated with nitric acid of specific gravity 1.432, until the liberation of nitrous vapour ceases, and the liquid be mixed with a little water to separate a small quantity of bitter principle, then by neutralization with potash and evaporation, a large quantity of carbazotate of potash in fine crystals is obtained.

Wool, morphia, narcotine, and myrrh, did not give carbazotic acid by treatment with nitric acid.†

INDELIBLE WRITING INK.

Make a saturated solution of indigo and madder in boiling water, and in such proportions as to give a purple tint; add to it from one-sixth to one-eighth of its weight of sulphuric acid, according to the thickness and strength of the paper to be used. This makes an ink which flows pretty freely from the pen; and when writing which has been executed with it is exposed to a considerable but gradual heat from the fire, it becomes completely black, the letters being burnt in and charred by the action of the sulphuric acid. If the acid has not been used in sufficient quantity to destroy the texture of the paper and reduce it to the state of tinder, the colour may be discharged by the oxymuriatic and oxalic acids and their compounds, though not without great difficulty. When the full proportion of acid has been employed, a little crumpling and rubbing of the paper reduces the carbonaceous matter of the letters to powder; but by putting a black ground behind them they may be preserved, and thus a species of indelible writing-ink is procured, (for the letters are in a manner shaped out of the paper) which might be useful for some purposes; perhaps for the signatures of bank notes.*

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* Monthly Mag.

† Ann. de Chimie.

FISSURES OF GLASS.

These fissures are distinguished by M. Fischer into four kinds. The first are such, that the liquid contained in the broken vessel escapes through them into the air. The second are such as retain the liquid, unless the vessel be immersed in water, or a similar fluid, and then the level of the two portions of fluid tend to approach each other. The third are not permeable unless the fluids on opposite sides have a chemical action on each other; whilst that action continues, the fissure is permeable, but being over, there is no longer a tendency to equality of level. This is also the effect produced by the membrane of the bladder. The fourth kind are so fine that no fluid passes, except in a single case. If a solution of nitrate of silver be put into a glass tube with such a fissure, the latter plunged into water, and then the liquids connected by a voltaic circle, consisting of a platina wire and one of copper or zinc, so that the platina shall be in the solution of silver, and the other wire in the water, in about twenty-four or forty-eight hours crystals of silver will be found on the platina wire, and nitrate of zinc or of copper in the water. If no voltaic circuit be used no salt of silver will be found in the water even after many days. Salts of lead, tin, and copper will not produce this curious effect.†

METHOD OF DISCOVERING POTASSA BY THE BLOW-PIPE FLAME.

M. Harkort of Freyberg says, that, in consequence of an observation made by Kirwan, namely, that oxide of Nickel with potash, gave a blue glass before the blow-pipe, whilst soda with the same oxide produced a brown glass, he was led to examine whether the distinction might not be made to afford a useful test. On making the experiment with potash, he obtained an excellent result; the blue produced is not likely to be confounded with that produced by cobalt, because it inclines to a milky appearance. So sensible is this test, that the presence of potash was readily discovered in the *periclinite* (a new variety of felspar, distinguished by Professor Breithaupt,) although existing there in very small quantity. The experiment relative to soda was not so successful, the glass acquiring only a weak brown colour.‡

GUINAND'S GLASS.

The materials used in the composition of glass are some saline substance, and some sort of silicious earth. With respect to the latter, it is indeed said, that all white transparent stones which will not burn to lime are fit to make glass. Where proper stone cannot be had, sand is used; and it is now almost the only kind of substance employed in the British manufactures of glass. The other ingredient is an alkali, either soda or potash, which is always used at first in a state of carbonate. There are other fluxes used for different kinds of glass, and for various purposes; of the oxides of lead, litharge and minium are found to be of singular use: the first of these is a powerful flux, and imparts to glass the valuable qualities of greater density, and of greater refractive power. A considerable quantity of this oxide is contained in the finer glasses, the flint-glass in particular, and that which is used for the table, for lustres, for artificial gems, and for most optical purposes. It is, however, well known that glass which contains much lead is extremely soft, very fusible, and liable to be corroded by very acrid liquors. There is, beside, much difficulty in so contriving the materials, that the glass shall be throughout of uniform density. Still this does not seem to present an insurmountable obstacle; and, from some analyses that have been made of M. Guinand's Swiss flint-glass, we should be induced to conclude that it is to the successful employment of this material that the superiority of his flint-glass has been owing. But a glass which is liable to corrosion by a powerful acid would likewise appear susceptible of oxidation—an unlucky process, which it is rumoured that a celebrated object-glass constructed from some of his glass, is at present undergoing.*

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* Brande's Journ. † Ann. der Phys. ‡ Jahr. der Chem.

SUGAR OF LIQUORICE ROOT.

Dobereiner and Robiquet have long since given processes for the purification of this substance; the latter precipitates it by vinegar. Berzelius separates it in the following manner. The liquorice-root is to be sliced and infused in boiling water; when cold the infusion is to be filtered, and sulphuric acid added to it gradually, as long as precipitation occurs. This precipitate is a compound of the acid with the saccharine matter. It is first to be washed with acidulated cold water, and then with pure water, till it ceases to be rendered acid: the precipitate is afterwards to be digested with alcohol which separates the vegetable albumen and dissolves the compound of sugar and sulphuric acid; there is then to be gradually added to the solution carbonate of potash or soda in fine powder, and when it ceases to be acid, it is to be decanted and evaporated. It is proper to leave a very slight excess of acid in the solution, and for this purpose it is convenient to set aside a portion to be afterwards added to the saturated solution, until it is rendered weakly acid. The liquor is then to remain in order that the sulphate of potash may separate, and afterwards it is to be evaporated.

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* Monthly Mag.

The saccharine matter is obtained in the form of a yellow transparent mass, which breaks into a coarse powder resembling amber—when heated in the air it swells up, inflames, and burns with a bright flame, but with smoke. When in powder it burns like the lycoyodium or powdered resin. It suffers no change by exposure to the air. The aqueous solution is precipitated by all acids, and the more perfectly as the solution is more concentrated, and especially if excess of acid be used. The washed precipitates have no sour taste, but on the contrary, a pure saccharine flavour which is developed in a short time. The precipitates are soluble in boiling water, and on cooling a yellow transparent jelly is formed if the solution be concentrated. Alcohol also dissolves them, and they burn without leaving any residuum.

The saccharine matter of liquorice combines also readily with bases; it is on this account very difficult to separate it from acids, without its retaining a portion of the bases employed for that purpose; the compounds with the alkalies dissolve readily in water, but with difficulty in alcohol; when they are perfectly saturated they contain no trace of carbonic acid, even when bases combined with carbonic acid have been employed, and their taste is purely saccharine, without mixture of alkalinity. The compounds formed with barytes and lime are soluble and are not precipitated by carbonic acid; this saccharine matter forms insoluble compounds with the metallic acids,—when poured into a solution of acetate of lead, a precipitate is formed, which when decomposed by sulphuretted hydrogen, forms a black liquid, in which the sulphuret of lead remains suspended; if it were not for this, it would be a good method of obtaining pure saccharine matter: the same substance is obtainable from the inspissated liquorice juice; but it is black and cannot be decolorized. It unites not only with acids and bases like the yellow saccharine matter, but also with salts, such as the sulphates of barytes, lime and potash. It precipitates many metallic salts.*

BLEACHING LIQUID.

When water is added to the chloride of lime, it effects its partial decomposition; one half of the chlorine leaves the lime, and dissolves in the water; and this is the bleaching liquid of the shops, which is sold at a high rate, although it cannot cost more than a farthing a gallon. Sometimes this fluid is applied immediately to the substance to be bleached, but sometimes a weak acid is added to destroy the slight affinity of the chlorine for the lime, and you will see by this addition, how much the bleaching power of the fluid is increased. The manufactory of the chloride of lime is carried on on a large scale in the north of England, by passing chlorine into leaden chambers containing hydrate of lime in fine powder.†

* Ann. de Chimie.

† Brande's Journ.

TEST FOR NITRIC ACID AND ITS COMBINATIONS.

POUR a solution of protomuriate of iron upon the surface of an amalgam of zinc, and then place a crystal of nitre upon the latter in the fluid; a dark band immediately forms around the crystals, sometimes extending over the whole surface of the mercury. All the nitrates, as well as nitric acid, act in this manner; but other salts, as the chlorate, produce no effects of the kind; so that a very sensible test of the presence of nitric acid is thus afforded. It is necessary that the solution employed be a protosalt of iron. If nitric acid is supposed to exist in a liquid, it should be saturated with potash, evaporated to dryness, and the dry mass tried. Of course, salts of copper or of silver must not be present

When an amalgam of brass is used instead of zinc, those effects are not produced; which M. Runge considers as a proof that the zinc or brass is combined, *chemically*, with the copper.*

SINGULAR ACTION OF ARSENIC ACID ON SUGAR.

WHEN a solution of pure arsenic acid is mixed with sugar and left for a few hours, a rose colour is produced which soon becomes a fine purple, and then remains, with little further change, for many days. Sugar of milk, mannite, raisin sugar, sugar of starch, produce similar effects; but sugar of liquorice, diabetic sugar, and such bodies as starch, gum, &c. produce no effect of the kind. Nor do the soluble arseniates or arsenious acid produce these effects with the substances named above.†

VELOCITY OF SOUND IN WATER.

EXPERIMENTS on the velocity of sound in water have been made by M. Colladon on the Lake of Geneva, and are connected with researches by himself and Sturm on the compressibility of fluids. The space through which the sound passed was about 45,000 feet (13487 metres.) The sound was produced by striking a large bell suspended in the water, and was heard by means of a peculiar apparatus, so constructed that the person who listened for it could also observe the signal at the bell, and both set going and stop the time-piece. The mean of several experiments was 9.4 seconds, for the whole distance: on dividing the distance by the time, the velocity of sound on the water of this lake was 1435 metres, or 4708 feet per second.

The water being examined, gave one six-thousandth of its weight of saline matter; and its specific gravity at 40° Fahr. was 1.00015.

M. Colladon remarks that the sound of a bell heard at some distance under water is strikingly distinct from that of the bell in air, being a short, brief noise, similar to that produced by striking two knives together. If the distance be increased, still the character is preserved, and it is impossible to distinguish whether the original blow is strong but distant, or nearer and weaker. It is only within the distance of 200 metres that the ringing of the bell is heard: in air the reverse of this takes place; the blows struck upon a bell are easy to distinguish near at hand, but at a distance melt into one continuous sound. This phenomenon depends upon the nature of the sonorous vibrations in water. In fact, it is known that in the vibratory motion of a fluid the duration of the motion of a particle is equal to the radius of the spherical portion of the fluid supposed to be agitated at the origin of the motion, divided by the velocity with which the sound is transmitted. The first of these qualities is necessarily smaller in water than in air; the second greater: from whence it follows, that the duration of the sound should be much less when transmitted by water than when by air.

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* Ann. der Physik. † Bull. Univ.

A second remark is, that sound is not transmitted from water to air when the direction of the vibrations forms a very small angle with the surface at which the two fluids meet. When the bell 6.56 feet below the surface was struck, the sound could be heard in the air at the surface of the water at the distance of 200 metres (656.17 feet;) but at a greater distance it diminished rapidly, and at 400 or 500 metres could not be distinguished. If, however, the head were immersed a little way in the water, or a trumpet-formed tube, full of air and closed by a diaphragm, were immersed, so that the diaphragm should be perpendicular to the line extending directly to the bell, then the sound could be heard even at ten or twenty times that distance.

The agitation of the waves produced no alteration in the velocity, duration, or distinctness of the sound under water, when a tube, like that just mentioned, was used to render them audible. Some experiments were made at very stormy periods, but with no observable difference on these points.*

HEAT DEVELOPED DURING COMBUSTION.

M. **Despretz** finds that when equal quantities of oxygen are used for the combustion of the following substances, the annexed proportions of heat are developed:

Hydrogen	2578°
Charcoal	2967
Iron	5325

Phosphorus, zinc, and tin give nearly the same quantities as iron. It appears then that of all bodies, hydrogen developes the least heat for the same proportion of oxygen gas absorbed; the metals disengage the most. It is remarkable that carbon, which does not alter the volume of the gas, evolves a quantity of heat which is equal to three-fifths of that given out by iron and the metals in general.*

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* Ann. de Chimie.

HARD WATER.

The hardness of river and shallow well water depends upon their containing calcareous salts with carbonate and sulphate of lime, one grain of the latter contained in 2,000 grains of soft water being sufficient to convert it into the hardest water that is commonly met with. Hard water is also subject to become putrid, on account of the vegetable or animal matter which it contains, and generally turbid from the suspension of earthy impurity; and when drunk, it is flat, from the absence of air.†

EFFECT OF ELECTRICITY ON POINTED LEAVES, &C. AND ON AGITATION.

For the double purpose of ascertaining the power of spines and sharp-pointed lanceolated leaves in modifying the electric relation of the atmosphere and the earth, and in affecting the progress of vegetation by their electric influence, M. Astier insulated a sextuple spine of the *Gleditzia triacanthos* at the top of his house, and brought a wire down from it to an insulated flower-pot, in which were planted five grains of maize; a similar sowing was made in an uninsulated pot, for the purpose of comparison. The experiment continued from the 6th to the 20th of June, including two stormy days. The electrometer gave considerable signs of electricity in the flower-pot, and by using the condenser sparks were produced. The electrified grains were found to pass more rapidly through the first periods of vegetation. When Bengal rose-trees were submitted to the same experiment, the flowers of the electrified plant appeared more rapidly and more abundant than in the other case.‡

EXTRAORDINARY EXPERIMENTS ON HEAT AND STEAM.

By Mr. Perkins.

A generator is said to have cracked when very hot, but no vapour or water issued out until the temperature was allowed to fall, and then the rush of steam by the aperture formed was tremendous. This was supposed to be because the heat repelled the water and vapour to a certain distance from the metal, and, virtually, stopped the crack; accordingly, another day, the generator was heated red hot at the cracked part, and water introduced in the usual way: neither steam nor water came out at the crack during the whole of the day, the generator being at work all the time; but in the evening, on cooling it, the same effects happened as before.

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* Ann. de Chimie. † Brande's Journ. ‡ Ann. Linn. de Paris.

As some persons still retained doubts, all these, it is said, were removed by the following experiment:—A hole, the eighth of an inch in diameter, was made in one of the extremities of one of the tubes of a generator, and an iron tube, three feet long, one inch external and half an inch internal diameter, screwed over it. The open end of this tube had a small cock, and at the other end of the generating tube was fixed a safety-valve with a pressure of 50 atmospheres on each square inch; to the same end was also fixed the pipe by which the forcing pump threw in water. After having made the pierced extremity of the generating tube red hot, water was introduced; the vapour formed escaped by the safety-valve, although charged to the extent above-mentioned, and yet, upon opening the stop-cock of the iron tube, *nothing* came out. The fire was then diminished, and when the temperature had sunk sufficiently, the escape of vapour was so great as to produce a terrible noise.

The repulsive power of the heated metal was sufficient, says Mr. Perkins, in reasoning upon the effect, to retain the *vapour* and the water equally distant; for what else is vapour than water in a state of expansion? The repulsive force in this account is said to be exerted to the distance of the sixteenth of an inch, for the hole was the eighth of an inch in diameter.*

THEORY OF FLAME.

SIR H. DAVY ascribes the security which the safety lamp affords, to the conducting power of the metallic gauze, by which it is supposed the temperature of the flame is so much lowered as to be insufficient to ignite the inflammable mixture on the outside. Some facts known to Signor G. Libri, of Florence, were at variance with this hypothesis, and he found, upon trial, that when single rods were made to approach a flame, the latter was always inflected on all sides from the rod, as if repelled by it; and that this effect was independent of the conducting power of the rod, whether good or bad. The amount of inflection or repulsion was directly as the mass, and inversely as the distance from the flame. It was not diminished by increasing the temperature of the rod even to such a degree as to render it scarcely possible for it to abstract any of the caloric. In fact, when two flames are made to approach each other there is a mutual repulsion, although their proximity increases the temperature, instead of diminishing it. From these principles, Sig. L. says, the theory of the safety lamp is easily deduced. A metallic wire exerting, according to its diameter and its own nature, a constant repulsion upon flame, it is evident that two parallel wires so near each other as not to exceed the distance of twice the radius of the sphere of repulsion, will not permit a flame to insinuate itself between them, unless it be impelled by a force superior to the intensity of repulsion. If to these two wires others be added, a tissue is formed impenetrable to flame, especially when the conducting power of the wires adds its influence to that of the repulsion. He conceives that, from the views above stated, the number of cross or horizontal wires in Davy's lamp is unnecessarily large; and that by rejecting all of these excepting a number sufficient to secure the firmness of the tissue, the lamp would afford as great a security as at present, and, at the same time, diffuse a much greater light—this opinion he has verified by actual experiment.[*]

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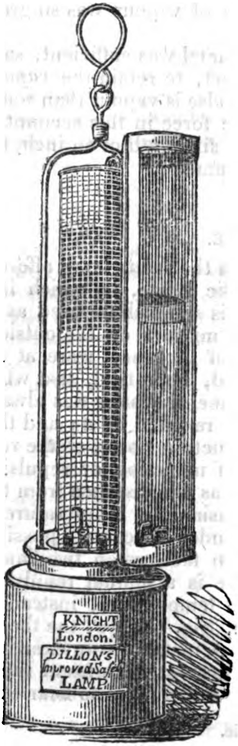
* Ann de Chimie.

SAFETY LAMP.



Mr. Dillon has lately introduced to the notice of the scientific world, an improvement upon the *Safety Lamp* of Sir Humphry Davy, which appears to us of sufficient interest for illustration in our pages. As the *Davy Lamp* is too well known to need special description here, it will be merely necessary to allude to the principle of the invention, in order to point out Mr. Dillon's improvement.

He maintains, in opposition to Sir Humphry Davy, that the Davy lamp acts by its heat and rarefaction, and not from Sir H. Davy's theory, that flame is cooled by a wire-gauze covering. He shows, by a simple experiment, that the Davy lamp is not safe in a current of hydrogen or carburetted hydrogen gas, and that many lives may have been lost from the confidence of miners in its perfect safety. A current of hydrogen or carburetted hydrogen gas steadily directed on the flame of the lamp from a bladder and stopcock, *by cooling the wire gauze*, brings the flame of the lamp through the gauze to the mouth of the stopcock, (even should there be six folds of gauze intervening.) He shows also, by immersing the lamp, when cold and newly lighted, into a jar of dense hydrogen or carburetted hydrogen gas,

[*] Monthly Mag.

or an explosive mixture with atmospheric air, that explosion takes place inside and outside of the lamp; whereas, when the lamp has burnt sufficiently long to heat the wire gauze, no explosion takes place on the outside of the lamp. These experiments appear incontrovertible in support of his theory, which is, "*that the wire gauze is merely the rapid receiver and the retainer of heat, and that it is the caloric in its meshes which prevents the flame of the lamp from being fed by the oxygen of the atmosphere on the outside.*

The experiments of Libri, showing that flame is inflected by metallic rods, and that "when two flames are made to approach each other, there is a mutual repulsion, although their proximity increases the temperature of each, instead of diminishing it," support Mr. Dillon's theory—the inflection being occasioned by the rarefaction of the air between the rod and the flame, the latter seeking for oxygen to support it in a denser medium, the two flames repelling each other for the same reason, and not from any mysterious and "repulsive effect of the wires of the gauze tissue." Mr. Dillon increases the heat of the lamp, and places on it a shield of talc to protect it from a current, and, upon his theory, the shafts or workings of iron and coal mines may be lighted with gas with perfect safety, protecting the flame with wire gauze and a circular shield of talc.*

CINCHONIA AND QUINIA.

At the evening meeting of the Royal Institution, Jan. 25, the following interesting subject was illustrated:—The discovery of the vegetable salifiable bases, and more especially of those alkaline substances which form the active principles in opium, and in the different species of cinchona. Mr. Brande observed, that these discoveries were not only curious as chemical investigations, but of the highest importance in their applications to medicine; he traced the history of the discovery of morphia, or the active principle of opium, and gave the credit of its discovery (and of the train of inquiry dependent upon it, so ably followed up by Pelletier and Caventou) to Sertuerner. The methods of obtaining morphia were described, specimens of it, and of some of its salts, were exhibited, and the properties of narcotine, another proximate principle of opium, but not salifiable, were adverted to. These investigations were chiefly dwelt upon as being the origin of subsequent discoveries in this difficult department of chemistry; but Mr. Brande observed, that in regard to their practical application to medicine, they were infinitely less important than those connected with the different kinds of Peruvian bark. Of this drug three varieties are directed to be kept for medical use, in the London Pharmacopœia. The cinchona lancifolia furnishes *pale bark;* the cinchona oblongifolia, *red bark;*

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* Mirror.

and the cinchona cordifolia, *yellow bark*. From the first of these Messrs. Pelletier and Caventon obtained the peculiar vegetable alkaline, or salifiable base, called *cinchonia*; it is crystallizable, intensely bitter, and forms distinct salts with the acids: from the last they also procured a distinct base, called *quinia*; it is not crystallizable, but forms several salts that are so, and which, like the former, are characterized by intense bitterness. The red bark contains both cinchonia and quinia. Specimens of these substances, and of their principal salts, were exhibited, and the modes of obtaining them described and illustrated. The compound which has gained most celebrity, and which, indeed, is a truly valuable addition to the Materia Medica, is the sulphate of quinia. Mr. Brande said, that he thought cinchonia and its salts had scarcely been fairly tried. The adulterations of sulphate of quinia, and the means of detecting them, were next adverted to, and the discourse concluded with some general remarks upon the chemical analogies existing among these vegetable proximate principles; among these were particularly noticed their very high equivalent numbers, and feeble saturating powers,—their general medical activity,—the insolubility of their compounds with gallic acid,—their difficult solubility in water, and comparative solubility in alcohol, and their existence in the vegetables whence they are obtained, in combination with peculiar acids which have been but little examined.*

ARTIFICIAL LIGHTNING TUBES.

M. **Beudant** has communicated to the *Academie des Sciences* the results which he has obtained, conjointly with MM. Hachette and Savart, respecting the formation of artificial lightning tubes. Natural philosophers have, for a considerable time, been satisfied as to the cause to which the formation of the vitreous tubes occurring in elevated sandy districts ought to be referred. The name of lightning tubes that has been given them, sufficiently indicates their being regarded as produced by lightning, which melts the sand to a considerable depth, so as to form a tube, commonly sinuous, with solids and smooth walls internally, and rough on the outside. Our readers will recollect, that very lately a young German naturalist presented to the Academy some of these tubes, the length of which extended to seventeen feet. Without harbouring any doubt respecting the mode of formation of these tubes, it has been asked, how electricity could produce effects so intense, and which have been considered so different from those obtained from artificial electricity. The authors of the experiments, the results of which M. Beudant communicated to the Academy, formed the idea of attempting to produce lightning tubes by artificial electricity. They employed, for this purpose, Charles's battery, at present in the College of France,

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* Brande's Journal.

and actually succeeded in forming fragments of tubes perfectly resembling the natural lightning tubes, only that their walls were less solid, and their length did not exceed a few centimeters.*

DIFFERENT EFFECTS OF AN ELECTRIC DISCHARGE IN MAGNETISING DIFFERENT NEEDLES.

M. Savary has recently found, that when a number of needles are electrified by a single discharge, some of them are rendered slightly magnetic, some highly so, and others not at all. For any discharge of determinate strength, the distance performs the principal part. The magnetic virtue goes on decreasing to a certain distance, then it disappears at a given distance;—it then increases progressively, is again extinguished, and again increases. The distance requisite to produce the maximum and minimum degree of magnetism depends on the strength of the discharge. M. Savary has likewise determined the effects produced by the interposition of screens.†

ON THE COLOUR OF WATER.—BY SIR H. DAVY.

***From Salmonia, or Dialogues on Fly Fishing.*—Poietes and Halieus.**

Poiet.—You, Halieus, must certainly have considered the *causes* which produce the colours of waters. The streams of our own island are of a very different colour from these mountain rivers, and why should the same element or substance assume such a variety of tints.

Hal.—I certainly have often thought upon the subject, and I have made some observations and *one* experiment in relation to it. I will give you my opinion, with pleasure, and as far as I know, they have not been brought forward in any of the works on the properties of water, or on its consideration as a chemical element. The purest water with which we are acquainted, is undoubtedly that which falls from the atmosphere. Having touched air alone, it can contain nothing but what it gains from the atmosphere, and it is distilled without the chance of those impurities which may exist in the vessels used in an artificial operation. We cannot well examine the water precipitated from the atmosphere as rain without collecting it in vessels, and all artificial contact gives more or less of contamination; but in snow, melted by the sunbeams, that has fallen on glaciers, themselves formed from frozen snow, water may be regarded as in its state of greatest purity. Congelation expels both salts and air from water, whether existing below, or formed in the atmosphere; and in the high and uninhabited regions of glaciers, there can scarcely be any substances to contaminate—removed from animal and vegetable life, they are even above the mineral kingdom; and though

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*** Jameson's Journal.**

† Le Globe.

there are instances in which the rudest kind of vegetation (forms of the fungus or mucor kind) is even found upon snows, yet this is a rare occurrence; and red snow, which is occasioned by it, is an extraordinary and not a common phenomenon towards the pole, and on the highest mountains of the globe. Having examined the water formed from melted snows on glaciers in different parts of the Alps, and having always found it of the same quality, I shall consider it as pure water, and describe its characters. Its colour when it has any depth, or when a mass of it is seen through, is bright blue; and, according to its greater or less depth of substance, it has more or less of this colour; as its insipidity and its other physical qualities are not at this moment objects of your inquiry, I shall not dwell upon them. In general in examining lakes and masses of water in high mountains, their colour is of the same bright azure. And Captain Parry states, that the water on the Polar ice has the same beautiful tint. When vegetables grow in lakes, the colour becomes nearer sea green, and as the quantity of impregnation from their decay increases—greener, yellowish green, and at length, when the vegetable extract is large in quantity—as in countries where peat is found—yellow, and even brown. To mention instances, the Lake of Geneva, fed from sources (particularly the higher Rhone,) formed from melting snow, is blue; and the Rhone pours from it, dyed of the deepest azure, and retains partially this colour till it is joined by the Soane, which gives to it a greener hue. The Lake of Morat, on the contrary, which is fed from a lower country, and from less pure sources, is grass green. And there is an illustrative instance in some small lakes fed from the same source, in the road from Inspruck to Stutgard, which I observed in 1815, (as well as I recollect,) between Nazareit and Reiti. The highest lake fed by melted snows, in March, when I saw it, was bright blue. It discharged itself by a small stream into another, into which a number of large pines had been blown by a winter storm; or fallen from some other cause; in this lake its colour was blue green. In a third lake, in which there were not only pines and other branches, but likewise other decaying vegetable matter, it had a tint of faded grass green; and these changes had occurred in a space not much more than a mile in length. These observations I made in 1815; on returning to the same spot twelve years after, in August and September, I found the character of the lakes entirely changed. The pine wood washed into the second lake had disappeared; a large quantity of stones and gravel washed down by torrents, or detached by an avalanche, supplied their place; there was no perceptible difference of tint in the two upper lakes, but the lower one, where there was still some vegetable matter, seemed to possess a greener hue. The same principle will apply to the Scotch and Irish rivers, which, when they rise or issue from pure rocky sources, are blue, or bluish green; and when fed from peat bogs, or alluvial countries, yellow, or amber-coloured, or brown—even after they have deposited a part of their impurities in great lakes. Sometimes, though rarely, mineral impregnations give colour to water; small streams are sometimes green or yellow from ferruginous depositions. Calcareous matters seldom affect their colour, but often their transparency, when deposited, as is the case with the Velino at Terni, and the Anio at Tivoli; but I doubt if pure saline matters, which are in themselves white, ever change the tint of water.

Orn.—On what then does the tint of the ocean depend, which has itself given name to a colour?

Hal.—I think probably on vegetable matter, and perhaps, partially, on two elementary principles, iodine and brome, which it certainly contains, though these are possibly the results of decayed marine vegetables. These give a yellow tint when dissolved in minute portions in water, and this mixed with the blue of pure water would occasion sea green. I made many years ago, being on the *Mer de Glace*, an experiment on this subject, I threw a small quantity of iodine, a substance then recently discovered, into one of those deep blue basins of water which are so frequent on that glacier; and diffusing it as it dissolved with a stick, I saw the water change first to sea green in colour, then to grass green, and lastly to yellowish green; I do not, however, give this as a proof, but only as a fact favourable to my conjecture.

Poiet.—It appears to me to confirm your view of the subject, that snow and ice, which are merely pure crystallized water, are always blue when seen by transmitted light. I have often admired the deep azure in crevices in masses of snow in severe winters, and the same colour in the glaciers of Switzerland, particularly at the arch where the Arve issues, in the Valley of Chamouni.

VARIABLE CONDUCTING POWERS OF BODIES FOR ELECTRICITY.

Professor Delarive of Geneva has found that the degree of conductibility of bodies for electricity *depends on the quantity of electricity which traverses them,* so that of two conducting bodies, that which is the best for one electric current may be the worst for either a stronger or a weaker current.*

DISTILLING AND EVAPORATING.

The fact that liquids are driven off, or made to boil at lower degrees of heat when the atmospheric pressure is lessened or removed, has recently been applied to some very useful purposes.

The process for refining sugar is to dissolve impure sugar in water, and after clarifying the solution, to boil off or evaporate the water again, that the dry crystallized mass may remain. Formerly this evaporation was performed under the atmospheric pressure, and a heat of 218° or 220° was required to make the syrup boil; by which degree of heat, however, a portion of the sugar was discoloured and spoiled, and the whole product was deteriorated. The valuable thought occurred to Mr. Howard, that the water might be dissipated by boiling the syrup in a vacuum or place from which air was excluded, and therefore at a low temperature. This was done accordingly; and the saving of sugar and the improvement of quality were such, as to make the patent right, which secured the emoluments of the process to him and other parties, worth many thousand pounds a year. The syrup, during this process, is not more heated than it would be in a vessel merely exposed to a summer sun.

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* Brewster's Jour.

In the preparation of many medicinal substances, the process of boiling *in vacuo* is equally important. Many extracts from vegetables have their virtues impaired, or even destroyed, by a heat of 212°; but when the water used in making the extract is driven off *in vacuo*, the temperature need never be higher than blood-heat, and all the activity of the fresh plant remains in the extract.

In the same manner, in the process of distillation,—which is merely the receiving and condensing again in appropriate vessels the aeriform matter raised by heat from any mass,—substances which are changed and injured by an elevated temperature, may be obtained of admirable quality by carrying on the operation in a vacuum. The essential oils of lavender, peppermint, &c. never had the natural flavour and virtues of the plants until within the last few years, since this plan has been adopted.

The influence on the human system of vegetable medicines thus obtained, is so different from that of the old preparations, that the practitioner requires carefully to advert to the circumstance.

The apparatus for evaporating and distilling *in vacuo* consists of vessels strong enough to bear, when quite empty, the external atmospheric pressure, and therefore generally of arched form. The vacuum is produced and maintained by air-pumps driven by a steam-engine or otherwise; or by the direct admission of steam, which after expelling the air is condensed into water.*

MEDAL FOR CHEMICAL DISCOVERIES.

JOHN FULLER, Esq. has founded a gold medal of the value of ten guineas, to be given to such members of the Royal Institution as have distinguished themselves by their labours in chemical science. He has liberally presented one of these medals to each of the following individuals, viz. Sir H. Davy, Dr. Wollaston, Mr. Hatchett, Mr. Brande, Mr. Faraday, Mr. Children, and Mr. F. Daniell; and proposes, in future, that one of these medals shall be presented biennially. The dies are executed by Mr. Wyon, chief engraver in His Majesty's Mint; upon the obverse is the head of Francis, Lord Bacon; and on the reverse an appropriate inscription, surrounded by wreaths of palm and laurel.*

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* Arnott's Physics.

MEANS OF ASCERTAINING THE PURITY OF SULPHATE OF QUINA.

By R. Phillips, Esq.

The great demand which has arisen for this important medicine, and the high price at which it is necessarily sold, have excited some, who are careless as to the means by which they acquire gain, to sophisticate it in a vast number of ways, and by every means which talent misapplied could suggest.

Having repeatedly of late been requested to examine various samples of sulphate of quina, I thought it might be useful to state the several modes which may be employed for that purpose; and I make the present communication with the greater confidence, because I have received the very able assistance of my friend, Mr. John T. Barry, of Lombard-street, to whose chemical skill, and the opportunity of frequently applying it, I am indebted for the greater number of hints and facts detailed in this paper.

Pure sulphate of quina has the form of minute fibrous crystals, it is inodorous, and its taste is bitter. If certain vegetable products, such as starch or sugar, be mechanically mixed with it, they may possibly be observed by merely inspecting the preparation with a glass.

1st. If the sulphate of quina be mixed with a considerable proportion of foreign matter, it may probably be detected by dissolving the salt in question in about three hundred times its weight of water,—say one grain in about five fluid drachms of boiling distilled water. On cooling, pure sulphate of quina will be deposited in feathery crystals in twenty-four hours, if there be no adulteration.

2ndly, As indirect, but as good collateral evidence, the taste of sulphate of quina of known good quality may be compared with that of another sample. Thus when pure, a grain of sulphate of quina will render nearly a pound and a half of water, or 10,500 grains, sensibly bitter.

3rdly, The alkalies either pure or their carbonates, if but slightly in excess, always occasion precipitation at ordinary temperatures in a solution of sulphate of quina containing only 1-1,000th of its weight, or less than one grain in two fluid ounces of water.

4thly, A solution of tannin occasions a very sensible precipitate in an aqueous solution of sulphate of quina, containing only 1-10,000th of its weight of the salt, provided there be no acid in excess. Kino is that form of tannin which best answers the purpose. It is, however, to be observed, that the salts of morphia, cinchona, strychnia, &c. are similarly affected by tannin; but they are not likely to be mixed with sulphate of quina.

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* Brande's Journal.

5thly, Sulphate of quina suspected to contain sugar, gum, or other substances soluble in cold water, may be tried by digesting the same portion of the salt in small and successive portions of water to saturation. If the sulphate of quina be pure, and the solutions all properly saturated, they will have the same taste and specific gravity; and similar portions will yield by evaporation equal quantities of solid residuum.

6thly, A repetition of the above process, substituting alcohol for water, answers for extracting resin and some other substances, because sulphate of quina is soluble in alcohol to only a limited extent.

7thly, If a white substance insoluble in cold water be found in the sulphate of quina, heat the mixture to about 170° of Fahrenheit. This will render starch soluble, and its presence may be determined by the addition of an aqueous solution of iodine, which will immediately occasion a blue colour, and eventually a blue precipitate. The iodine should be added in very small quantity.

8thly. Sulphate of quina has been adulterated with ammoniacal salts. These are rendered obvious by adding a little of the suspected salt to a solution of potash. If any ammoniacal salt be present, ammoniacal gas will be readily detected, either by the smell, or by holding over the mixture a piece of turmeric paper, or a bit of glass moistened with acetic acid.

9thly, To ascertain whether sulphate of quina contains any earthy salts, such as sulphate of magnesia, or sulphate of lime, burn a portion of it in a silver or platina crucible, or even in a clean tobacco-pipe. Any earthy salt, or any matter indestructible by heat, will of course remain in the vessel.

10thly, To ascertain that the sulphate of quina contains the proper quantity of sulphuric acid and quina, dissolve a little in pure muriatic or nitric acid, and add a solution of muriate or nitrate of barytes; 60 parts should give about 17.3 to 17.4 of sulphate of barytes; or the method may be varied without the trouble of drying the precipitate. Dissolve 60 grains of sulphate of quina in water slightly acidulated with muriatic or nitric acid; add a solution of 18 grains of nitrate of barytes, and separate the precipitated sulphate of barytes by filtering. If nitrate of barytes be now added to the clear solution, it should still occasion slight precipitation, for 60 of sulphate of quina contain 5.8 gr. of sulphuric acid, equivalent to 19.1 of nitrate of barytes.

The test is only to determine that there is no crystallized vegetable matter uncombined with sulphuric acid in the sulphate of quina; the detection of earthy or alkaline sulphates has already been provided for.

11thly, Sulphate of quina should lose not more than from 8 to 10 per cent. of water by being heated till deprived of its water of crystallization. Mr. Barry informs me that he once examined a sample which contained more than 40 per cent. of water in excess diffused through it.*

ON THE RELATION OF WATER TO HOT POLISHED SURFACES.

The tranquil state of a drop of water in a very hot silver teaspoon, or metallic capsule, with the comparative lengthened period of its evaporation, are facts well known, and are usually explained by admitting the intervention of a film of vapour which prevents the contact of the water and the metal, and so interferes with the transmission of heat. Mr. Perkins thinks he has proved that other causes are importantly active; but without referring to the opinions on this point, I have thought it may be interesting to point out another form of the experiment which I have often witnessed. A large trough of water being placed under the fire bars of a powerful furnace, the water soon becomes heated by the fall of ashes into it, and the communication of heat both by radiation and condensation. With the ashes fall numerous small globules of slag highly heated, and these will frequently remain upon the surface of the water, slightly depressing it at the place, and will float quietly about for several seconds, as drops of water or alcohol, and other substances, do upon masses of their own fluids. During this time they retain a high temperature, cooling by comparison very slowly; but on a sudden, when at a certain point, they come in contact with the water, hiss, are quenched, forming steam, and instantly sink. When these globules have been afterwards examined, they have been found now and then hollow, but generally solid, highly polished, very round and heavy, as slags ordinarily are.*

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* Phil. Mag.

SPONTANEOUS COMBUSTION OF THE HUMAN BODY.

After rejecting all the hypotheses hitherto proposed, M. Julia Fontenelle (in the Academy of Sciences at Paris,) concludes that this phenomenon is the result of an internal decomposition, and is altogether independent of the influence of external agents. We give his own words:—

"We consider," says he, "what are called spontaneous combustions of the human body, not as true combustions, but as intimate and spontaneous reactions, which depend upon new products originating from a degeneration of the muscles, tendons, viscera, &c. These products, on uniting, present the same phenomena as combustion, without losing any of the influence of external agents, whether by admitting the effect of the opposite electricities of Berzelius, or by adducing in example the inflammation of hydrogen, by its contact with chlorine, arsenic, or pulverized antimony, projected into this latter gas, &c."

It may be objected, however, that whatever may be the cause which induces this combustion, the caloric disengaged ought to be considerable, and consequently should ignite all the objects in the neighbourhood. We reply to this, that all combustible substances do not by any means disengage an equal quantity of caloric by combustion. Davy has shown, that a metallic gauze, having 160 holes in the square inch, and made of wire one-sixtieth of an inch in diameter, is penetrated at the ordinary temperature by the flame of hydrogen gas, while it is impermeable to that of alcohol, unless the gauze be very much heated. According to the same chemist, gauze of this kind, raised to a red heat, allows the flame of hydrogen gas to pass through it.

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* Correspondent, Brande's Journal.

without being permeable to percarburetted hydrogen gas. It is probable from this, that the products arising from the degeneration of the body, may be very combustible, without, however, disengaging as much caloric as the other combustible bodies known, and without leaving a residuum as to the two latter gases; and, in fine, we are of opinion, that, in some subjects, and chiefly in women, there exists a particular diathesis, which, conjoined with the asthenia occasioned by age, a life of little activity, and the abuse of spirituous liquors, may give rise to a spontaneous combustion. But we are far from considering as the material cause of this combustion, either alcohol, or hydrogen, or a superabundance of fat. If alcohol plays a prominent part in this combustion, it is by contributing to its production; that is to say, it produces, along with the other causes mentioned, the degeneration of which we have spoken, which gives rise to new products of a highly combustible nature, the reaction of which determines the combustion of the body.*

PURIFICATION OF ALCOHOL.

A PRIZE was offered by the Royal Academy of Brussels to the person who should prove upon what the differences between alcohol, extracted from various substances, as fruits, grain, roots, sugar, &c. depended. This was obtained by M. Hensmans, who was led, by numerous experiments, to conclude that the alcohol was always identical, but that the difficulty, more or less great, always found in rectifying it, as well also as the difference in taste, depended upon the presence of a fatty matter, and a little acetic ether. The fatty matter, when alone, may be separated by several distillations, but the acetic ether is not removed in this way. It is better, in every case, for the removal of both, to add a little caustic potash, or soda, to the alcohol, to be rectified. Carbonated alkali does not act with sufficient energy.†

BROMIDE OF GOLD.

M. BALARD observed the solubility of the gold in bromine. According to M. Lampedius, 100 parts of the dry bromide contains 56 parts of gold. This substance is of a greyish-black colour; it dissolves readily in water, and then produces a deep red liquid which yields crystals of hydrobromate of gold: one grain of the crystals colours 5,000 grains of water.‡

COMBINATION OF LIME WITH WATER.

ACCORDING to M. Bellani, when lime combines with water, notwithstanding the intense chemical action which takes place and the heat evolved, there is no ultimate condensation between the elements and of the hydrate. Lime was put into a matras, and then the vessel filled to the middle of the neck with water; the place of the surface of the water was then marked, after which heat was applied and the lime converted into a hydrate, no vapour being allowed to escape; when the whole was cool, the place of the surface was exactly in the same part of the neck as at first.[*]

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* Jameson's Journ. † Bull. Univ. ‡ Jahrbuch der Chemie

SOLUBILITY OF CORROSIVE SUBLIMATE IN ETHER AND ALCOHOL BY CAMPHOR.

Camphor powerfully aids the solution of corrosive sublimate in ether and alcohol.

4	parts of ether	without camphor dissolved	1	part of corrosive sublimate.
4	. .	with 4 of camphor .	2	”
4	. . .	8 . . .	4	”
4	. . .	16 . . .	8	”
4	. . alcohol	4 . . .	4	”
4	. . .	8 . . .	8	”[†]

ANCIENT CANNON RAISED FROM THE SEA.

A **fisherman** of Calais drew up a cannon, of very ancient form, from the bottom of the sea, by means of his nets. M. de Rheims has since removed the rust from it, and on taking off the breech, was much surprised to find the piece still charged. Specimens of the powder have been taken, from which, of course, all the saltpetre has disappeared after a submersion of three centuries. The ball was of lead, and was not oxidized to a depth greater than that of a line.[‡]

INFLUENCE OF ELECTRICITY ON THE EMANATION OF ODOURS.

When a continued current of electricity traverses an odoriferous body—camphor, for example—the odour of this substance becomes more and more feeble, and at last entirely disappears. When this has taken place, and when the body, withdrawn from all electrical influence, is put in communication with the ground, it will remain without odour for some time. The camphor, however, resumes its former properties gradually and slowly. M. Libri, of Florence, the author of this curious experiment, has promised to describe it with more detail.[§]

ON THE ACTIVE PRINCIPLE OF HEMLOCK.

According to MM. Brandes and Giseke, the best method of obtaining this vegeto-alkali consists in digesting the fresh plant for several days in alcohol, filtering and evaporating the liquid, mixing the residue with water, and acting either by alumina, magnesia, or the oxide of lead; the whole is then to be evaporated to dryness and the substance obtained acted upon by a mixture of alcohol and ether; the solution being evaporated, yields the principle now distinguished by the name of Conin *(Conia.)* This principle is said to possess decided alkaline properties; its aqueous solution forms an abundant red precipitate, with tincture of iodine. Half a grain of the substance will kill a rabbit, the symptoms being the same as those produced by strychnia*

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[*] Giornale de Fisica.

[†] Bull. Univ.

[‡] Journ. des Débats.

[§] Monthly Mag.

TRANSPIRATION.

It is impossible to allude to transpiration without immediately conjuring up in imagination the figure of old Sanctorius and his balance, the honest physician accurately weighing himself, so as to calculate his losses by transpiration at different periods, and compared with the quantities of food which he swallowed. But, in his days, the knowledge of physics was at a very low ebb, and hence his aphorisms require the more finished touch of modern physiology.

It appears, that in twenty-four hours the losses which the body sustains in weight are not equal throughout the day and night, but exhibit fluctuations, depending on various circumstances referrible to physical and vital causes. Among the first may be reckoned temperature and pressure, dryness and humidity, repose or agitation of the air; and among the second are, the constitutional health, repose and activity of the body, &c., while some of the physical causes possess a double influence, both vital and physical, such as *light*. Under such circumstances it is clear, that knowledge of physical laws is essential, in order to compute the individual influence of physical agents in retarding or accelerating transpiration. The importance also of this function in the animal economy enhances the value of an intimate acquaintance with its vital relations.†

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* Bull. Univ.

† From the French of Dr. Edwards.

NATURAL HISTORY.

STUDY OF NATURE.

If we look with wonder upon the great remains of human works, such as the columns of Palmyra, broken in the midst of the desert, the temples of Pæstum, beautiful in the decay of twenty centuries, or the mutilated fragments of Greek sculpture in the Acropolis of Athens, or in our own Museum, as proofs of the genius of artists, and power and riches of nations now past away; with how much deeper a feeling of admiration must we consider those grand monuments of nature, which mark the revolutions of the globe; continents broken into islands; one land produced, another destroyed; the bottom of the ocean become a fertile soil; whole races of animals extinct, and the bones and exuviæ of one class covered with the remains of another; and upon the graves of past generations—the marble or rocky tombs, as it were, of a former animated world—new generations rising, and order and harmony established, and a system of life and beauty produced, as it were out of chaos and death; proving the infinite power, wisdom, and goodness, of the Great Cause of all Being![*]

TEMPERATURE.

In Dr. Edwards's work, "*De l'Influence des Agens Physiques sur la Vie*," the author, treating of Temperature, thus alludes to the curious and interesting experiments of Delaroche and Berger. Several species of vertebrated animals were placed by these authors in a temperature varying from 42° 5′ to 45° cent., when most of them remained quiet at first, but after the lapse of half an hour they became restless, and in three quarters of an hour their respiration was hurried on to almost suffocation. The result showed, that vertebrated animals in a dry air, heated to 45° cent., are near the utmost limit of temperature in which they can exist a long time: for, after recovering the effects of this heat, they were removed to an atmosphere of from 56° 25′ cent. to 65° cent., when, excepting one frog, they all died, and at different periods between the space of twenty-four minutes, and one hour and fifty-five. We know not of human beings supporting so great a heat during so long a time; but during a short period a higher temperature has been supported. A young man remained twenty minutes in an oven, heated to 210° Fahrenheit, without much inconvenience, when his pulse was raised from twenty-five to a hundred and sixty-four, which is the highest degree of rapidity; the temperature was nearly that of boiling water. However, M. Berger and Sir Charles Blagden exceeded this, the former enduring 109° 48 cent. during seven minutes, and the latter from 240° to 260° Fahrenheit eight minutes.

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[*] Sir H. Davy.

M. Delaroche could not remain more than ten minutes and a half in a vapour bath at 37° 5 cent., increased in eight minutes to 51° 25′ cent., and subsequently lowered one degree. M. Berger was obliged to get out of a vapour bath at a temperature between 41° 25′ to 53° 75′, in twelve minutes and a half. He was much weakened, tottered on his limbs, and was affected with giddiness; and these symptoms continued some time. Yet both these persons sustained equal and superior temperatures in dry air during a much longer time, and without any remarkable inconvenience. The sensation in damp air is more intense, and resembles that of contact with boiling water. It is said, that the peasantry of Finland can remain upwards of half an hour in a vapour bath heated to 70° or 75° cent. It is evident, that a bath of hot water, at the same heat, will produce a much more powerful influence upon the animal economy.

M. Delaroche sought to ascertain what increase the temperature of the body acquires under certain degrees of heat. In a vapour bath, heated from 37° 5′ to 48° 75′ cent., the temperature of the body was raised by 3° 12′ cent., as indicated in the mouth. On M. Berger making the same trial with vapour at from 40° to 41° 25′, the temperature of his body acquired 1° 87′ in fifteen minutes. But this object is better achieved by experiments on animals of warm blood than on man. Accordingly, different species of mammiferæ were placed in an oven heated to 93° 75′ cent. Notwithstanding the variety of species, birds, &c. enclosed in dry air, heated as stated above, all of them acquired nearly the same increase of temperature; we may, therefore, fairly infer, from results so uniform, that man and warm-blooded animals, under the influence of excessive heat in dry air, cannot, during life, sustain an elevation of vital temperature beyond 7° or 8° cent. In the cases of the animals last-mentioned they all died. These results are not applicable in like manner to cold-blooded animals; 40° 93′ cent. is the greatest degree of heat which these were found to reach at the period of their death.

OYSTERS.

After the month of May, it is felony to carry away the caltch (the spawn adhering to stones, old oyster-shells, &c.) and punish-able to take any oysters, except those of the size of a half-crown piece, or such as, when the two shells are shut, will admit of a shilling rattling between them.

The liquor of the oyster contains incredible multitudes of small embryo oysters, covered with little shells, perfectly transparent, swimming nimbly about. One hundred and twenty of these in a row would extend one inch. Besides these young oysters, the liquor contains a great variety of animalcules, five hundred times less in size, which emit a phosphoric light. The list of inhabitants, however, does not conclude here, for besides these last mentioned, there are three distinct species of worms (called the oyster-worm,) half an inch long, found in oysters, which shine in the dark like glow-worms. The sea-star, cockles, and muscles, are the great enemies of the oyster. The first gets within the shell when they gape, and sucks them out.

While the tide is flowing, oysters lie with the hollow side downwards, but when it ebbs they turn on the other side.

SWARMING OF BEES.

An interesting communication was read, at a recent sitting of the Royal Society, from T. A. Knight, Esq. describing the precaution taken by a swarm of bees, in reconnoitering the situation where they intend to establish their new colony or swarm from the parent hive. The bees do not go out in a considerable body, but they succeed each other in going and returning, until the whole of the swarm have apparently made good the survey, after which the whole body take their departure in a mass. If by any chance a large portion of a swarm take their departure without the queen bee, they never proceed to take up the ulterior quarters without her majesty's presence. The result of Mr. Knight's observations tends to prove, that all the operations of a swarm of bees are dictated by previous concert, and the most systematic arrangement.

EXPERIMENT ON THE HUMAN BODY.

An experiment to ascertain the degree of heat it is possible for man to bear, was lately made at the New Tivoli, at Paris, in the presence of a company of about 200 persons, amongst whom were many professors, savans, and physiologists, who had been specially invited to attend by the physician Robertson, director of that establishment. The man on whom the experiment was made is a Spaniard of Andalusia, named Martinez, aged forty-three. A cylindrical oven in the shape of a dome had been heated for four hours by a very powerful fire. At ten minutes past eight the Spaniard, having on large pantaloons of red flannel, a thick cloak also of flannel, and a large felt, after the fashion of straw hats, went into the oven, where he remained, seated on a foot-stool, during fourteen minutes, exposed to a heat of from 45 to 50°; of a metallic thermometer, the gradation of which did not go higher than 50°. He sang a Spanish song while a fowl was roasted by his side. At his coming out of the oven, the physicians found that his pulse beat 134 pulsations a minute, though it was but 72 at his going in. The oven being heated anew for a second experiment, the Spaniard re-entered and seated himself in the same attitude, at three quarters past eight, ate the fowl, and drank a bottle of wine to the health of the spectators. At coming out his pulse beat 176, and the thermometer indicated a heat of 110° of Reaumur. Finally, for the third and last experiment, which almost immediately followed the second, he was stretched on a plank, surrounded with lighted candles, and thus put into the oven, the mouth of which was closed this time. He was there nearly five minutes, when all the spectators cried out, "Enough! enough!" and anxiously hastened to take him out. A noxious and suffocating vapour of tallow filled the inside of the oven, and all the candles were extinguished and melted. The Spaniard, whose pulse beat 200 at coming out of this gulf of heat, immediately threw himself into a cold bath, and in two or three minutes after was on his feet safe and sound.

"In this," says the Monthly Magazine, "there is nothing new. Sir C. Blagden, secretary to the Royal Society about thirty years since, remained, accompanied by a female dog, during eight minutes, in an oven heated to 100° of Reaumur, 20° above the point at which water boils, water although covered with oil, boiled close to him, and in thirteen minutes, the hot air being concentrated by a pair of bellows, some beef was dressed in the same place. Two French academicians of the last century, saw at Larochefoucault a man, who, from habit, supported during ten minutes the heat of an oven, in which fruits and meats were cooked; they found the heat to be 112° of Reaumur, 32° above that of boiling water. The rarity of the air, its weak conducting power, and its small capacity for caloric, serve to explain how a person can exist in so warm an atmosphere. It is by its action upon the skin, and the consequences which ensue from that, that fire becomes injurious. Now the Spaniard who has been exhibiting himself in Paris, is wrapped up in wide pantaloons, *en molleton*, of red wool, a loose mantle also of wool, and wears on his head a great quilted felt cap; and the wool being a bad conductor of heat, their wonder-working genius, like the Monsieur Velocipede recently imported into this country, should awaken the astonishment of the ignorant alone."

AMBER.

POLANGEN, the frontier town of Russia, is famous for its trade in amber. This substance is found by the inhabitants on the coast, between Polangen and Pillau, either loosely on the shore, on which it has been thrown by the strong north and westerly winds, or in small hillocks of sand near the sea, where it is found in regular strata. The quantity found yearly in this manner, and on this small extent of coast, besides what little is sometimes discovered in beds of pit coal in the interior of the country, is said to amount to from 150 to 200 tons, yielding a revenue to the government of Prussia of about 100,000 francs. As amber is much less in vogue in Western Europe than in former times, the best pieces, which are very transparent, and frequently weigh as much as three ounces, are sent to Turkey and Persia, for the heads of their expensive pipes and hookahs. Very few trinkets are now sold for ornaments to ladies' dresses; and the great bulk of amber annually found is converted into a species of scented spirits and oil, which are much esteemed for the composition of delicate varnish. In the rough state, amber is sold by the ton, and forms an object of export trade from Memel and Konigsberg.*

CURIOUS CASE OF SPECTRAL ILLUSION.

(From the Phrenological Journal.)

HAPPENING, on a very recent visit to the country, to be in company with Mrs. D., the phenomena of spectral illusions chanced to be mentioned. Mrs. D. took an especial interest in the discussion, as she had experienced both illusions and local pain. She gave that pointed and clear account of both, which we should expect from a well educated, intelligent, and candid woman. In her waking hours, this lady was literally tortured with horrid faces glaring at her, and approaching close to her in every possible aggravation of horror. She was making a tedious recovery in child-bed when these symptoms troubled her. Besides the forms, which were of natural colour, though often bloody, she was perplexed by their variation in size, from colossal to minute. Mrs. D. had also entire human figures, but they were always as minute as pins, or even pinheads, and were in great confusion and numbers, indicating morbid action of order and number. Like Mr. John Hunter too, and the opium-eater, Mrs. D. had illusive perceptions in that function of weight which gives the perception of equilibrium a just relation to gravitation. She was dreadfully annoyed with the sensation of descending without the means of stopping. The opium-eater experienced falling as if for millions of miles, and considered that illusion the most insupportable of the many ones which punished the insane debauchery of his pernicious habit. The only other illusion suffered by Mrs. D. was flashing light, showing, as in Miss S. L., over excited colouring. The illusion did not, in her case, present entire spectres, recognisable as known individuals; but, like some of Miss S. L.'s, and the opinm-eater's, were visitations of what the latter call "the tyranny of the human face."

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* Granville's Travels.

Mrs. D. then described the pain which accompanied her illusions, viz.: acute pain in the upper part, or root of the nose, the seat of the organ of form, and all along the eye-brows, which takes in individuality, size, weight, colouring, order, and number.

GREEN COLOUR OF THE SEA, PRODUCED BY ANIMALCULÆ.

In the Greenland seas, about one part of the surface between the parallels of 74° and 80° is of an olive, or grass-green colour, which often occurs in long bands or streams, from a few miles to ten or fifteen miles in breadth, and from two to three degrees of latitude in length. These belts of green water are frequently separated as distinctly from the transparent blue water, as the waters of a large muddy river on entering the sea. This colour has been ascertained to be caused by an animal of the medusa kind, from one-twentieth to one-thirtieth of an inch in diameter, the surface of which is marked with twelve distinct patches, or nebulæ of dots of a brownish colour, disposed in pairs, four pairs, or sixteen pairs, alternately composing one of the nebulæ. The body of the medusa is transparent. The fibrous or hair-like substances were more easily examined, being of a darker colour. They varied in length from a point to one-tenth of an inch, and, when highly magnified, were found to be beautifully moniliform. In the largest specimens these bead-like articulations were about 30, and the diameter of each about the 8-300th part of an inch. The number of these animalculæ, particularly medusæ, was found to be immense, in olive-green sea-water, being about one-fourth of an inch asunder. A cubic inch of water will, of course, contain 64; a cubic foot, 110,592; and a cubic mile, 23,888,000,000,000,000. Now, allowing that a person could count a million of these animalculæ in seven days, which is barely within the reach of possibility, it would have required that 40,000 persons should have started at the creation of the world to complete the enumeration of those contained in a cubic mile of sea-water.*

LINGGA.

In the last volume of the transactions of the Batavian Society of Arts and Sciences is an interesting paper by M. Van Angelbeck, on the Island of Lingga. It is divided into three parts. In the first, he considers the island in a geological point of view; the second he devotes to the history and moral condition of the Malays; and in the third he describes their government, trade and occupations. The island of Lingga is the actual residence of the primitive Malays. Its capital, called *Kwala Dai*, is the ordinary place of abode of the sultan. Its climate is healthy; and there are but few diseases, the principal of which are of the skin. This island is very mountainous, and is covered with wood. In its forests grows the fine tree called *chalcas paniculata;* and the soil indicates the presence of rich tin mines. It is also said that there is some gold. M. Van Angelbeck observes that the country is magnificent, that nature shows herself there in all her force; but that it is vexatious to see that the natives benefit only partially from its fertility. They devote themselves but little to agriculture, which is held in disesteem. Fishing is almost their sole occupation, and the fish are abundant and excellent.

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* Athenæum.

PORTUGUESE MAN-OF-WAR INSECT.

THIS worm, between 6 and 8 inches in length, has seemingly the skill of an experienced navigator, and is in itself a little ship. Its evolutions are according to the winds; it raises and lowers its sail, which is a membrane provided with elevating and depressing organs. When filled with air, it is at the same time provided with a structure which furnishes it with the necessary ballast. When high winds would endanger its existence, it descends into the deep. From the under side of the body proceed tubes which extend 20 feet in length, and are so elastic and delicate, that they wind in a spiral form like a screw, serving at once as anchors, defensive and offensive weapons, pneumatic tubes and feelers. The insect has the colours of the rainbow; its crest, which performs the office of a sail, is intersected with pink and blue veins, trimmed with a rosy border, and swells with the winds, or at the animal's pleasure. The fibres contain a viscous matter, which has the property of stinging like nettles, and produces pustules. It acts so strongly, that vessels in which they have been kept for a time, must be repeatedly washed before they can be used. These fibres may be cut off without depriving them or the rest of the insect of the principle of life; and the separation takes place spontaneously, whenever the glutinous matter comes in contact with a hard surface, like the sides of a glass globe. The insect has, however, dangerous enemies in small dolphins and medusæ, against which neither its nautical skill nor its poison can defend it.*

CREATION.

THE lower we go in the scale of creation, the more surprising is the reproductive faculty. How liable is the earth-worm to be injured by the unconscious gardener; but the injury, so far from diminishing animal life, increases it; for each portion, into which the animal is divided by the spade, becomes a separate creature, having a separate system of parts speedily regenerated. The head of the common snail, with its four horns, has been satisfactorily explained to be renewed in the course of six months;

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* North American Review.

and in an animal of more complicated structure, the water-newt (the *lacerta palustris*,) a complete eye was re-formed in the course of ten months, with all its various parts. The star-fish, and anemone, may have their tentacula removed, and they are speedily replaced; and if these animals are divided, two or more distinct animals are the consequence. But the fresh-water polype affords the most extraordinary example of any known of this wonderful power; for, in whatever way it may be cut or divided, each part becomes, in a few days, a separate animal, capable of all the functions of its parent.*

DEAF AND DUMB ASYLUM.

At the Mechanics' Institution, February 1, Dr. Birkbeck on lecturing on the organs of sense, introduced three boys from the Asylum, who had been taught to speak. Dr. Watson who conducts the seminary in the Kent-road, has raised the art to great perfection. The doctor commences by showing the deaf and dumb boy the object he wishes him to name; the doctor uncovers his own throat and pronounces the word slowly and distinctly repeatedly; he then makes the boy watch the motion of his lips, and put his fingers to his bare throat to feel the progress of the words. The boy then makes an effort to pronounce the word, and the doctor finds that after a few lessons and close attention to the formation of the words, the boy succeeds. Without hearing a sound, he learns by his *sight* to speak, which three of the pupils on the evening above mentioned testified to a very attentive audience. There were four verses of *Gray's Elegy* recited by them with very appropriate gestures and voices that needed nothing but modulation.†

NEW HOLLAND.

A very small portion of New Holland is as yet at all known. The Dutch and French have visited certain parts of the coast, and Dampier, Cook, Flinders, and King have more minutely examined the rest, so that we have most of the bays and prominent headlands laid down with sufficient accuracy; but beyond this, with the exception of Sydney and its dependencies, not a mile of the interior is known. Discoveries, it is true, are slowly and gradually making, particularly to the northward on the eastern coast, where some harbours of no mean dimensions, and rivers of considerable magnitude have recently been found, where none had been supposed to exist, the overlapping of headlands having concealed them from the coasting navigator. Many great rivers, we have no doubt, will yet be found to exist on the northern and north-eastern coasts—were it otherwise, this immense continent would present a physical constitution in its geographical phenomena, at variance with what occurs in all other countries.*

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* Conversations on Animal Economy.

† Mirror.

SALMON FISHERIES.

THE deep water, or submarine haunts of the salmon, are unknown; those retreats to which they betake themselves in their debilitated condition, after spawning, and from which they issue forth in their highest vigour. They begin to approach the coast and enter the rivers, as stragglers, about February, increasing in numbers towards May and June; when the drought and heat of summer render the streams unfit for their reception. At this period they crowd, in shoals, towards the coast, and roam about in the estuaries (or arms of the sea,) until the autumnal floods again entice them to enter the rivers. While thus detained on the coast, and in the estuaries, they are pursued and preyed upon by numerous herds of seals and grampuses, which consume many more than fall to the lot of the fisherman. The early *run* fish are in good condition, the roe being still small, and they seem to be destined to mount towards the higher and more distant branches of the river. Towards August and September, the roe has acquired such a size as to render the fish nearly useless as food, and greatly to limit the extent of its migrations. Having arrived at suitable spawning ground, salmon pair, and proceed to the shallow, gravelly fords, at the top and bottom of pools, and there, in company, make their spawning bed, which sometimes reaches from 12 feet in length to 10 in breath. This bed is furrowed by the parent fish working up against the stream, and the spawn is deposited and covered at the same time. This process frequently occupies more than a week; during which, the eggs deposited by a single fish, sometimes amount to the astonishing number of 20,000! This spawning season, extends from the end of October to the beginning of February, and, according to very satisfactory evidence, it occurs nearly about the same time throughout all the rivers of the United Kingdom. The parent fish having thus accomplished the important purposes of their migration into the river, now retire into the deeper pools, whence, after remaining for a considerable time, they direct their course towards the sea, chiefly during the months of February, March, and April—the male fish appearing to migrate earlier than the females.

The eggs of the salmon remain in the gravel for several months, exposed to the influence of running water. In the course of the month of March, and nearly about the same period in all our rivers, the fry are evolved. When newly hatched, they are scarcely an inch in length, of the most delicate structure, and, for awhile, connected with the egg. Upon leaving the spawning bed, the fry betake themselves to the neighbouring pools, where they speedily increase to two or three inches in length. In April, May, and June, they migrate towards the sea, keeping near the margin, or still water, in the river, and when they reach the estuary, they betake themselves to a deeper and more sheltered course, and escape to the unknown haunts of their race, to return shortly after as grilses, along with the more aged individuals. All these seaward migrations of the parent fish, and the fry, are influenced, and greatly accelerated, by the occurrence of floods in the rivers.*

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* Quarterly Review.

HOT SPRINGS,

SAYS Berzelius, occur in the vicinity of all active volcanoes; it is, therefore, probable that such waters owe their temperature to their passage through channels heated by volcanic fire.

MINERAL WATERS OF CARLSBAD.

THE origin of these wells must have taken place at an extremely remote period. Professor Berzelius assumes it to have been coeval with the violent revolutions in nature, by which the valley of Carlsbad was created; which hypothesis is strongly supported by the circumstance, that the covering of the subterraneous reservoir (called there the kettle) of the Sprudel-fountain, composes, for a considerable extent, the actual bed of the river Tepel, and must, therefore, have existed before the valley was excavated to its present depth by the river. The lid, as it were, of this boiler, in some places eight feet in thickness, is composed of the earths precipitated from the water. It represents a lime-stone of the hardness of marble, assumes a polish, and consists of parallel strata, varying in every shade, from dark brown to yellow and white. Over this lid, which is of considerable extent, the greater part of the town of Carlsbad is built, and the water issues forth through several openings, which it is found requisite to widen, from time to time, by boring, to prevent the dangerous consequences of an explosion of the lid.†

LUMINOUSNESS OF THE OCEAN.

THE luminousness of the ocean is one of the most beautiful phenomena of nature, which excites surprise, although, for months together, it may be seen every night. The sea is phosphorescent in all latitudes; but he who has not witnessed this phenomenon in the torrid zone, and especially in the Pacific ocean, can form but an imperfect idea of the magnificence of such a spectacle. When a vessel of war, impelled by a fresh breeze, cleaves the foamy waves, and one is stationed near the shrouds, he cannot be

* Quarterly Rev. † Brande's Journ.

satisfied with viewing the beautiful phenomenon which presents itself. Every time that the side of the ship as she rolls, emerges from the water, flashes of reddish light seem to issue from the keel, and dart toward the surface of the sea. Le Gentil and the elder Forster, explained the appearance of these flashes by the electrical friction of the water against the body of the advancing ship. But in the present state of our knowledge, this explanation is no longer admissible.

There are few points of natural history respecting which there have been so many disputes as the light emitted by the waters of the ocean. What we know with precision on the subject, reduces itself to the following facts. There are various shining mollusca which, during their life, emit at pleasure a rather weak phosphoric light, generally of a bluish colour. This is observed in the *Nereis noctiluca*, the *Medusa pelagica*, and the *Monophora noctiluca*, discovered during Captain Baudin's expedition. Of this number are also the microscopic animals, which have not as yet been determined, and which Forster saw swimming in the sea in innumerable multitudes, near the Cape of Good Hope. The luminousness of sea water is sometimes occasioned by these living lanterns. I say sometimes; for, in most cases, notwithstanding the use of magnifying glasses, no animal is perceived in luminous water; and yet, whenever the wave happens to strike a hard body and breaks, producing foam, and whenever the water is strongly agitated, a light is produced resembling a flash of lightning. This phenomenon probably originates from the decomposed fibrils of dead mollusca which exist in infinite quantity in the depths of the sea. When this luminous water is passed through a piece of dense cloth, these fibrils are sometimes detached from it under the form of luminous points. When we bathed in the evening in the Gulf of Cariaco, near Cumana, some parts of our bodies remained luminous on coming out of the water. The luminous fibres stuck to the skin. From the immense quantity of mollusca dispersed through all the seas of the torrid zone, it need not be surprising that the water of the sea is luminous, even when no organic matter can be separated from it. The infinite division of all the dead bodies of dagyses and medusæ may render the entire sea capable of being considered as a gelatinous fluid, and which is in consequence luminous, has a nauseous taste, cannot be drunk by man, but affords nourishment to many fishes. If a board be rubbed with a part of the body of the Medusa hysocella, the place rubbed becomes luminous whenever the finger, well dried, is passed over it. During my passage to South America, I sometimes put a medusa on a tin plate. If I struck the plate with another metal, the smallest vibrations of the tin were sufficient to make the animal shine. How did the blow and the vibration act in this case? Was the temperature instantaneously raised? Were new surfaces uncovered, or did the blow make the phosphuretted hydrogen gas escape, so that, coming into contact with the oxygen of the atmosphere, or with the water of the sea, it produced combustion? This effect of the blow which excites the light is particularly striking in a jumbling sea, when the waves dash against each other in all directions. Between the tropics, I have seen the sea luminous at all temperatures; but it was more so before storms, or when the sky was lowering, cloudy, and much overcast. Cold and heat seem to have little influence upon this phenomenon; for, on the Banks of Newfoundland, the phosphorescence is often very strong at the severest time of the winter. Sometimes, all other circumstances appearing to be the same, the phosphorescence is very distinct on one night, and the following night there is scarcely any. Does the atmosphere favour this disengagement of light, this combustion of phosphuretted hydrogen? Or do not these differences depend merely upon chance, which leads the navigator into a sea more or less filled with mollusca? Perhaps, also, the luminous animals only come to the surface of the sea when the atmosphere is in a certain state. M. Bory St. Vincent, asks with reason, why our fresh marsh-water, which is filled with polypi, is not luminous? It would appear in fact, that a particular mixture of organic particles is necessary to favour this disengagement of light. Willow-wood is more phosphorescent than oak. In England, salt-water has been rendered luminous by casting herring brine into it. Galvanic experiments show that the luminous state of living animals depends upon an irritation of the nerves. I have seen an *Elater noctilucus*, which died, diffuse a strong glow when I touched its anterior extremities with tin or silver. Sometimes, also, the medusæ give out a stronger light at the moment when the galvanic chain is closed.*

MIGRATION OF FISHES.

FISHES appear to execute annually two great migrations. By one of these shiftings, they forsake the deep water for a time, and approach the shallow shores; and by the other, they return to their more concealed haunts. These movements are connected with the purposes of spawning, the fry requiring to come into life, and to spend a certain portion of their youth in situations different from those which are suited to the period of maturity. It is in obedience to these arrangements that the cod and haddock, the mackerel and herring, annually leave the deeper and less accessible parts of the ocean, the region of the zoophytic tribes, and deposit their spawn within that zone of marine vegetation which fringes our coasts, extending from near the high-water mark of neap-tides, to a short distance beyond the low-water mark of spring tides. Amidst the shelter in this region, afforded by the groves of arborescent fuci, the young fish were wont, in comfort, to spend their infancy; but since these plants have been so frequently cut down to procure materials for the manufacture of kelp, and the requisite protection withdrawn, the fisheries have suffered in consequence. Even the finny tribes inhabiting lakes, as the gwinead and other species, periodically leave the deep water, and, in obedience to a similar law, approach towards the margin, and deposit their spawn. We may add that in the shallow water, in both cases, the numerous small animals reside, which constitute the most suitable food for the tender fry.

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* Humboldt, Tableaux de la Nature.

Many species of fish, as the salmon, smelt, and others, in forsaking the deep water, and approaching a suitable spawning station, leave the sea altogether for a time, ascend the rivers and their tributary streams, and having deposited their eggs, return again to their usual haunts. Even certain species of fish, inhabiting lakes, as the roach, betake themselves to the tributary streams, as the most suitable places for spawning.*

FEATHERS AND HAIR.

M. Frederick Cuvier, in some recent observations on the structure of feathers and hair, establishes a perfect analogy between prickles and feathers. Both are produced by the same organs, and are subjected to the same mode of growth. In the prickles, as in feathers, the horny matter is produced by the membrane of a sheath, and the spongy matter by the surface of a bulb; and it is exclusively from the form of these same organs that the forms of the prickles result, which, like the feathers, are produced in a real mould. Hairs do not, as was hitherto supposed, form an essential part of the skin. They have a principle of existence of their own, and belong to a system of organs not less remarkable, sometimes, for its complexity than for its development. This system may be associated with the dermis, and be developed in different points of its substance; but even then, it is not confounded with that organ, but preserves its peculiar nature.

M. Cuvier concludes from this, that the hair has never hitherto occupied the rank which is due to it in zoological systems. He considers the organic system which produces the hairs as analogous to that of the senses, and even as forming part of it; for in a great number of animals the hairs are a very delicate organ of touch; the slightest touch, even that produced by a hair of the human head, is sufficient to make certain animals, cats for example, contract their skin and make it tremble, as they always do to rid it of light bodies which stick to it, and of whose presence they are apprized by this peculiar sense of touch.†

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* Quart. Rev.

† Jameson's Jour.

CORAL ISLANDS.

According to Linnæus and Ellis, the calcareous zoophytes, such as the tubipores, millepores, and madrepores, are inhabited by animalculæ, which have some affinity to the nereids, medusæ, and hydræ; but more recent investigations have shown, that all the corals which form rocks, or *Saxigenous lithophytes* of the French zoologists, and even the *Pavonia Caryophyllea* and the *Nullipora* of Lamarck, serve as a habitation to gelatinous mollusca of a particular kind, or are surrounded by them. Since Cook's voyage, Forster's observations have given occasion to geologists to think that many islands and entire countries have owed their origin to the coral produced by these animalculæ. I have seen some of these coral islands covered with a pitiful vegetation, and I have no doubt that many of those of the Pacific Ocean have been formed in this manner. It appears to me, however, that too much importance has been attributed to this theory, on which M. Adelbert de Chamisso, an excellent observer, has thrown much light. In the West Indies, for example, limestone rocks of tertiary formation, which contain petrified madrepores and tubipores, have been taken for recent works of coral animals, merely because they occur in places where similar animals are still observed. But when we penetrate into the interior of the large Antilles, there occur mountains of primitive formation, which to a great height are surrounded by the same madrepore rocks. These rocks have, consequently, emerged from the chaos of an ancient world. Between the tropics, on the shores of the Gulf of Mexico, the traveller runs the risk of confounding with old coral beds, strata of tertiary limestone, which are placed above chalk, and filled with coral petrifactions.*

SEA AND FRESH WATER.

The mixture of the water of rivers with that of the sea, presents some hydrostatical phenomena, which it is curious enough to observe. Fresh water being lighter, ought to keep at the surface, while the salt water, from its weight, should form the deepest strata. This, in fact, is what Mr. Stevenson observed in 1818, in the harbour of Aberdeen, at the Mouth of the Dee, and also in the Thames near London and Woolwich. By taking up water from different depths, with an instrument invented for the purpose, Mr. Stevenson found that, at a certain distance from the mouth, the water is fresh in the whole depth, even during the flow of the tide, but that a little nearer the sea, fresh water is found at the surface, while the lower strata consists of sea water. According to his observations, it is between London and Woolwich, that the saltness of the bottom begins to be perceptible. Thus, below Woolwich, the Thames, in place of flowing upon a solid bottom really flows upon the liquid bottom formed by the water of the sea, with which it is no doubt more or less mixed. Mr. Stevenson, however, is of opinion, that at the flow of the tide, the fresh water is raised, as it were, in a single mass, by the salt water which flows in, and which ascends the bed of the river, while the fresh water continues to flow toward the sea.*

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* Humb. Tableaux de la Nat.

DIVERSITY OF TASTE RESPECTING FOOD.

We have many examples of the partiality of comparatively civilized races of men to a diet which to us appears loathsome and offensive, and which these nations, from habit, or naturally depraved taste, would prefer to the choicest dishes at an alderman's dinner in Guildhall. The Pariahs of Hindostan (it is observed in a recent work,) attracted by the stench of rotten carcasses, fly in crowds to dispute the infectious carrion with the dogs, and birds of prey. They share the mass of corruption, and return to their dens to devour it without rice, seasoning, or any other accompaniment. Little do they care of what disease the animal may have died, for they make no scruple to poison secretly their neighbours' oxen and cows to provide a savage repast for their ravenous appetites. The bushmen of southern Africa generally eat the flesh raw; and when they cook it, they only warm it, and apply their teeth to it the moment it is taken from the ashes. The inhabitants of the Kurulean Isles are very partial to bear's liver. Chinese are not particular in their choice of animal food: cats, dogs, rats, and almost every species of animals, serpents, &c.; and which have either been killed or died a natural death. It was a practice in China at one time, for tavern keepers to put to death a fat guest, when opportunity served, and to make pies, &c. of the flesh, for the entertainment of their other guests, who were not so fortunate as to be so well fed. Bears' paws, birds' nests, and sea-slug, are considered great delicacies. The Thibetians prefer raw to roasted mutton. The Cochin Chinese prefer rotten eggs to fresh; putrid eggs cost more than the latter by 30 per cent.†

NUTRITIOUS SUBSTANCE TRANSPORTED BY THE WIND.

M. Thenard presented to the French Academy of Sciences, in August last, a substance, which was communicated to him by the Minister for Foreign Affairs. This substance was sent to the minister, as having fallen from the sky, in Persia, at the commencement of the present year. It occurred in such abundance that the ground was of a sudden entirely covered by it over a great extent. In some spots it was 5 or 6 inches deep. It was eaten by cattle, and particularly sheep; and bread was made of it, which afforded nourishment to man. Such were the accounts furnished to the French Consul in Persia, by a Russian general, who was an eye-witness. M. Thenard had first presented the specimens to M. Desfontaines, who recognised in them a species of lichen described by botanists. These lichens, which, it would appear, occur in very great abundance, had been transported by the wind to the places where their sudden appearance was observed. A similar phenomenon occurred in the same parts of Persia in 1824.

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* Jameson's Jour.

† Chinese Chronicle of Malacca.

FECUNDATION OF FLOWERS.

Formerly the fecundation of flowers, in which the sexes are separated, was almost wholly attributed to the wind. Kohlreuter and Sprengel have proved, with astonishing sagacity, that bees, wasps, and a great number of small winged insects, perform the principal part in this operation. I say the principal part; for to assert that the fecundation of the germen absolutely cannot take place without the intervention of these little animals, does not seem to me in conformity with the genius of nature, as Wildenow has demonstrated at length. But, on the other hand, it must be observed, that dichogamy, the coloured spots of the petals, which indicate the vessels in which the honey is contained, and fecundation by the contact of insects, are three circumstances almost inseparable.*

SPONTANEOUS ORGANIZATION OF MATTER.

M. Bory de St. Vincent has occupied himself for some time past with a variety of microscopic observations, having for their object to prove the natural tendency of matter to become organized. Observing the appearances successively presented in water exposed to light, he thought he saw, for the first time, matter assume the aspect of a simple mucosity, without colour or form. If the water contains any animal substance, it produces a pellicle of this mucosity at its surface, then becomes turbid, and discloses an infinity of living atoms, if we may so call those monads, which, after being magnified a thousand times, are not so large as the point of a needle, and which yet move in all directions with prodigious velocity. This is what M. Bory names matter in the living state. When the water is exposed to the air and light, there quickly forms what is named the green matter of Priestly, which many observers have supposed to be the first state of certain confervæ, or plants of a like nature. M. Bory thinks that it is a combination of a more general form, and only susceptible of entering into the composition of these plants, as well as of the animalculæ which issue from it, and which produces them. He names this combination matter in the vegetative state.

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* Humboldt.

It is by it that the infusory animals are rendered green. Those which colour oysters, according to M. Gaillon's observations, produce this effect, as M. Bory says, only because they are themselves coloured by the green matter. It colours in the same manner, the water and the shells of these oysters; and it would not be impossible to find some tinged directly by this matter, without any animalcules having penetrated into them.*

CLOTH FABRICATED BY INSECTS.

The larvæ of the butterfly, *T*inea punctàta, or *T.* padilla, have been directed by M. Habenstreet, of Munich, so as to work on a paper model, suspended from the ceiling of a room. To this model he can give any form and dimensions, and he has thus been enabled to obtain square shawls, an air balloon, four feet high, and a woman's complete robe, with the sleeves, but without seams. One or two larvæ can weave a square inch of cloth. A great number are, of course, employed, and their motions are interdicted from the parts of the model not to be covered, by oiling them. The cloth exceeds in fineness the lightest gauze, and has been worn as a robe over her court dress, by the queen of Bavaria,†

THE ANT AND THE APHIS OR PLANT LOUSE.

Mr. Carpenter happening once to beat down a number of áphides out of a stunted oak-tree, at the foot of which was an ants' nest, was very much surprised at seeing soon afterwards the ants busily employed in carrying up the áphides and carefully replacing them again upon the leaves of the tree; they feeding upon the honey-dew, which is well known, is produced by the àphis.‡

THE KRUBUT, OR GREAT FLOWER OF SUMATRA.

Rafflesia (in honour of the late Sir Stamford Raffles governor of Sumatra, and founder of the Zoological Society) Arnóldii (in memory of Dr. Arnold, the discoverer in 1818,) is one of the most extraordinary of vegetable productions. It is a parasite, growing in woods, on the roots and stems of those immense climbers, generally of the genus *V*itis, which are [illegible]d, like cables, to the largest trees in the forest. The flower constitutes the whole of the plant, there being neither leaves, roots, nor a stem. It is a true parasite, growing out of another plant in the manner of the mistletoe, and not on the decayed surface of plants, as the common fern on the trunks of old oak pollards. In the latter case the proper term is epiphyte (*epi*, upon, *phyton*, a plant.) The flowers are of one sex, and only the male has yet been sent to England. The breadth of a full-grown flower exceeds 3 feet; the petals, which are subrotund, measure 12 inches from the base to the apex, and it is about a foot from the insertion of the one petal to the opposite one; what is considered the nectarium would hold 12 pints; the pistils, which are abortive, are as large as cows' horns, and the weight of the whole is calculated to be about 15 lbs. The flower, fully blown, was discovered in a jungle, growing close to the ground under the bushes, with a swarm of flies hovering over the nectary, and apparently laying their eggs in its substance. The colour of the five petals is a brick red, covered with protuberances of a yellowish white. The smell is that of tainted beef. The structure of Rafflès*ia* is too imperfectly known to admit of determining its place in the natural system; but Mr. Brown, from whose learned paper on the subject, in the Linnean transactions, this notice is taken, is inclined to think it will be found to approach either to Asarinæ or Passifloreæ. Its first appearance is that of a round knob proceeding from a crack or hollow in the stem or root. This knob, when cut through, exhibits the infant flower enveloped in numerous bracteal sheaths, which successively open and wither away as the flower enlarges, until, at the time of full expansion, there are but a very few remaining, which have somewhat the appearance of a broken calyx. It takes three months from the first appearance of the bud to the full expansion of the flower. The fruit has not yet been seen by botanists, but is said by the natives to be a many-seeded berry. The female flower differs little in appearance from the male, further than being without the anthers of the latter. In Mr. Brown's observations on Rafflès*ia*, he observes, that it is not common for parasite plants to fix indiscriminately on the roots or branches of their stocks, as is supposed to be the case with Rafflès*ia*, and that "plants parasitic on roots, are chiefly distinguishable by the imperfect developement of their leaves, and the entire absence of green colour; that their seeds are small, and their embryo not only minute, but apparently imperfectly developed." The modes of union between a parasite and its supporter or stock, vary in different genera and species of this class of vegetables. Some, as the mistletoe and Rafflès*ia*, depend on the stock for nourishment during the whole of their existence; others, as the common broom-rape, are originated in the soil, and afterwards, when they have attached themselves to their stock, the original roots die; other parasites, again, are originated on the stock, and in their more advanced state produce roots of their own. In some cases the nature of the connexion between the parasite and the stock is such, "as can only be explained on the supposition, that the germinating seed of the parasite excites a specific action in the stock, the result of which is the formation of a structure, either wholly or in part derived from the root, and adapted to the support and protection of the undeveloped parasite; analogous, therefore to the production of galls by the puncture of insects." On this supposition may be explained, the connexion between the flower Rafflèsia and the root from whence it springs.*

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* Jameson's Jour. † Jour. of Arts. ‡ Tech. Repos.

THE MANDRAKE.

A ROOT of the Mandrake, Mandrágora officinàlis, of the extraordinary length of 3 feet, and weighing 10 pounds, was lately dug up, in removing the ruins of an ancient edifice at Brighton. As the mandrake is not indigenous, and as there has been no garden in the field where it grew for many ages, the plant is presumed to have stood there for several centuries, probably since the demolishing of monastic buildings by Henry VIII., at which time the root of the mandrake was held in high estimation by credulous persons. The mandrake is generally believed to be the *dudaim* of the ancient Hebrews, and the plant which was so coveted by Rachel. (*Brighton Herald.*) The Editor of the *Mag. Nat. Hist.* thinks the above root much more likely to be that of the common white bryony Bryònia álba.

IMMENSE HALIBUT.

A HALIBUT, 3 feet 6 inches in breadth, 7 feet 6 inches in length, and weighing 320 pounds, was taken, off the Isle of Man, and brought to Edinburgh fish-market on April the 5th, being the largest of that species ever seen there. This fish belongs to the same family as the turbot. It inhabits the European and North American seas, and is the largest of all aquatic animals except the whale tribe, frequently weighing 400 pounds. The body is mucous, with oblong scales sticking firmly to the skin, which is liver-coloured above and white beneath. The flesh is fat and coarse, except the part which adheres to the side fins.†

THE "NAPOLEON" CHILD.

ON Friday August the 8th, we paid a visit to the Bazaar in Oxford-street, to witness this extraordinary sport of nature. The child is an engaging little girl, about three years old. The colour of her eyes is pale blue, and on the iris or circle round their pupils, the inscriptions on

Left Eye.	*Right Eye.*
NAPOLEON EMPEREUR.	EMPEREUR NAPOLEON.

may be traced in the above sized letters, although all the letters are not equally visible, the commencement "NAP" and "EMP" being the most distinct. The colour of the letters is almost white, and at first sight of the child they appear like *rays*, which make the eyes appear vivacious and sparkling. The accuracy of the inscriptions is much assisted by the stillnes of the eye, on its being directed upwards, as to an object on the ceiling of the room, &c.; and with this aid the several letters may be traced with the naked eye.

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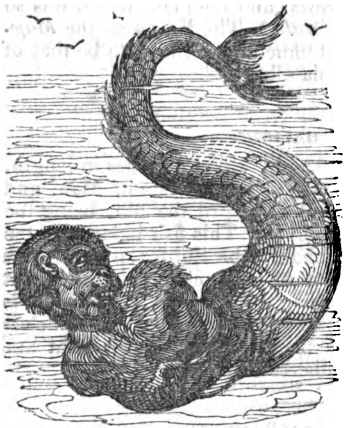
* Trans. Lin. Soc.

† Mag. Nat. Hist.

This effect is accounted for by the child's mother earnestly looking at a franc-piece of Napoleon's which was given to her by her brother previous to a long absence; and this operating during her pregnancy, has produced the appearance in question. It was visible at the child's birth, and has increased with her growth.*

TESTS BY WHICH A REAL MERMAID MAY BE DISCOVERED.

By a Correspondent of Loudon's Magazine of Natural History.



I VENTURE to address you upon a subject which has at various times interested the ingenious, and not a little puzzled philosophers themselves; I mean the tests by which a real mermaid may be discovered; if, indeed, there is such an animal at all. I am led into these reflections by having lately visited one of the principal cities in Holland, in the museum of which I was shown one of these wonderful creatures; of this, from memory, I have made a slight sketch. It was in a glass case, and about three feet in length. The face, head, and breast were like those of a monkey of the orang-outang kind; but it had no arms, and, from the middle downwards, it resembled a fish. I asked some questions concerning it, and was informed that its inward conformation down to the middle resembled that of a human being; that, like an honest creature, it had its heart in the right place; that its lungs were excellent; and that it was not deficient in brains! I asked from whence it came, and was told from Japan; and I could not help replying, after I had spent some time in its examination, that, if it had been presented as an artificial instead of a natural curiosity, it would have been worthy of admiration, but that, as it was, I conceived it to be an unworthy imposition. My reasons are deduced from the following considerations:—And to speak, first, as to what concerns the perfection of its lungs; fishes, with the small exception afforded by the cetaceous class, being, according to the best authorities, devoid of hearing, are also denied a voice; for, in creatures who could not converse with each other, this would indeed have been an incongruous superfluity. How, then, came this singular inhabitant of the great deep to be thus wonderfully endowed with organs of which it could never make any use? If, too, as it appears from its being so rarely seen, its place is at the bottom of the sea, how could a creature with a conformation of the lungs resembling our own, live and breathe there, when there is nothing better authenticated, than that the most expert and practised divers are unable to stay at the bottom of the sea more than half an hour? But supposing it, for argument's sake, belonging to the class of fishes to which I have adverted, it is a well attested fact, that they are not able to remain under the water for more than two or three minutes together, before they rise to its surface, in order to take in a new inspiration; and is it possible that this animal should be so rarely seen, if this were the case? Further, every inhabitant of the waters carries on its motions through them by means of its fins, as birds do theirs through the air by their wings; and, to be entirely equipped, two pair of fins and three single ones appear necessary to the former, though one pair of wings is sufficient for all the wants of the latter. Of these the pectoral fins, which are placed near the gills, act like oars, and serve to impel the animal forward; they likewise keep the head from descending too much into the water, or from being too much above it. The ventral fins are nearer the tail, and seem chiefly useful in balancing the fish in the water; and of the single fins it may be observed, that the dorsal fin and the anal one, which are on the ridge of the back, serve, in some degree, all these purposes, while the tail answers to all intents the purpose of a rudder. This, as I said before, is the perfect complement of a fish in the way of fins; nevertheless, there are many not, in this way, so perfectly endowed, because some peculiarity in their conformation, would render so great a number of fins superfluous, if not, indeed, retarding to them. For instance, the form of the *Muræ'na*, or eel, being so entirely equal, requires little balance either one way or the other, it is, therefore, entirely destitute of ventral fins; and the Gymnòtus (*gymnos*, naked, *notos*, back,) or *Carapo*, having the back broad and flat, would rather be rendered unsteady if it were in possession of a dorsal fin. Some fishes, also, have no tail fin. But what shall we say to a fish of above three feet in length, which has no fin but that; which has, as one may say, a broad chest and a heavy head, without any one contrivance to keep it from being, at all times, lower than any other part of its body? It might, indeed, be inferred, that so extraordinary a creature would live in an extraordinary manner; and certainly no manner could be more extraordinary, than that of living with its head downwards, and its tail in the opposite extreme! But this must be impossible under these points of view; and, I am apt to believe, that if all mermaids were tried by one or other, or all, of these tests, they would be found equally imaginary.

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* The Mirror.

THE JACULATOR FISH OF JAVA.

James Mitchel, Esq. surgeon, who gives an account of these extraordinary animals in the "Edinburgh New Philosophical Journal," June 1828, found them in the possession of a Javanese chief. The fish were placed in a small circular pond, from the centre of which projected a pole upwards of two feet in height. At the top of this pole were inserted small pieces of wood sharp pointed, and on each of these were placed insects of the beetle tribe. When all had become tranquil after the placing of the beetles by the slaves, the fish came out of their holes, and swam round about the pond. One of them came to the surface of the water, rested there, and, after steadily fixing its eyes for some time on an insect, it discharged from its mouth a small quantity of watery fluid, with such force and precision of aim, as to force it off the twig into the water, and in an instant swallowed it. After this another fish came, and performed a similar feat, and was followed by the others, till they had secured all the insects. I observed, that if a fish failed in bringing down its prey at the first shot, that it swam round the pond till it came opposite the same object, and fired again. In one instance, I observed one of these animals return three times to the attack before it secured its prey; but, in general, they seemed to be very expert gunners, bringing down their prey at the first shot. This fish, in a state of nature, frequents the shores and sides of the sea and rivers in search of food. When it spies a fly sitting on the plants that grow on shallow water, it swims on to the distance of from four, five, or six feet from them, and then, with surprising dexterity, it ejects out of its tubular mouth a single drop of water, which never fails to strike the fly into the sea, where it soon becomes its prey.

DOG TRAINS OF THE NORTH-WEST.

By Dr. Lyman Foot.

Travelling in the North-west is effected by dog-trains. Three dogs will carry a man and his provisions. The traders travel all over the wilderness with them, over unbeaten snow, generally following the course of rivers.

As night approaches, the traveller seeks a thicket, to protect him as much as possible from the wind. He then digs an elliptical hole in the snow, with a snow shoe, at one end of which a fire is built. The bottom is covered with evergreen boughs, on which he spreads a blanket, and wraps himself up, with his feet to the fire. If the night is stormy, large evergreen boughs are placed across the hole, supported by the walls of snow on each side. Thus the traveller and his dogs sleep comfortably in the coldest weather.

The dogs are easily trained to turn, halt, or go by the word of command. The whip is only meant to crack at them, or give any one of them a severe whipping if he is obstinate. When the traveller wishes his dogs to turn to the left, he says "chuck" or "chuch," and cracks his little whip on the right side of his train; if to the right, he says "ge," and cracks it on the left side. When they wish them to start or quicken their gate, he says "march," or "avance," *(avancez;)* when they wish to turn short about, they most commonly get out, or put one foot out, slew the train partly round, and say "vena isse," *(venez ici,)* or as the Canadians pronounce it, "vena issit," making a motion with the little whip at the same time. It is astonishing to see with what facility dogs are taught and managed. I own a train of dogs, one of which I broke myself. They are a great amusement to me in winter. I frequently ride over the river, and a mile or two round for amusement, and have, with three dogs, taken my wife and little boy a mile, to make calls on a genteel family, over the river, (a Mr. Erwatingen,) who has resided here ten years, carrying on the fur trade.*

THE SERVICES WHICH THE LITTLE BIRD CALLED TROCHILOS RENDERS TO THE CROCODILE.

By M. Geoffroy St-Hilaire.

On the 28th January, 1828, M. Geoffroy St-Hilaire communicated to the Academy of Sciences at Paris, a paper upon two species of animals called Trochilos and Bdella by Herodotus. The author began by announcing that his memoir was, properly speaking, only a commentary on a short passage from Herodotus. "When the crocodile," says this great historian, "feeds in the Nile, the inside of his mouth is always covered with bdella (a term which the translators have rendered by that of *Leech.*) All birds *except one* fly from the crocodile, but this one bird, the Trochilos, on the contrary, flies towards him with the greatest eagerness, and renders him a very great service; for every time that the crocodile comes to the land to sleep, and when he lies stretched out with his jaws open, the Trochilos enters and establishes itself in his mouth, and frees him from the bdella which he finds there. The crocodile is grateful, and never does any harm to the little bird who performs for him this good office."

This passage is one of those which has most exercised the sagacity of commentators. Some have looked upon it merely as a pleasant story, while others, in order to justify Herodotus, have pushed their zeal so far as to create an animal which could impose upon the crocodile, and be capable of all the actions attributed to the *Trochilos*. M. Geoffroy St-Hilaire proposes to show that Herodotus has been defended as awkwardly as he has been attacked unjustly. During his long residence in Egypt, M. Geoffroy had repeated occasion to ascertain that the story of Herodotus, though correct in substance, was inexact only in some particular details. It is perfectly true that a little bird does exist, which flies incessantly from place to place, searching everywhere, even in the crocodile's mouth, for the insects which form the principal part of its nourishment This bird is seen everywhere on the banks of the Nile; and Geoffroy having succeeded in procuring one, recognized it as belonging to a species already described by Hasselquist, under the name of *Charadrius Ægyptius*. There is in France a bird very like it, if not precisely the same, namely, the *small ringed plover*. With his slender beak this bird can take nothing but the smallest insects, the spawn of fish, or those molecular debris, those fragments of animal *detritus* which the action of the waters throws incessantly upon the banks.

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* Silliman's Journal.

If the Trochilos is in reality the little plover, the animals described by Herodotus under the name of bdella cannot be *leeches*, (besides, leeches do not exist in the running waters of the Nile,) but a very small insect of that species which swarm in those damp and warm regions, known by the name of *gnats* in Europe, and of *maringouins* in America. Myriads of these insects dance upon the borders of the Nile, and when the crocodile reposes on the land he is attacked by their innumerable swarms. His mouth is not so hermetically sealed as to prevent them from introducing themselves; and they penetrate in such vast numbers, that the inner surface of his palate, which is naturally of a bright yellow, appears to be covered with a brownish black crust. All these sucking insects drive their stings into the orifice of the glands, which are numerous in the mouth of the crocodile. It is then that the little plover, who follows him everywhere, comes to his succour, and delivers him from these troublesome enemies;—and that without any danger to himself, for the crocodile is always careful when he is going to shut his mouth to make some motion which warns the little bird to fly away. At St. Domingo there is a crocodile which so nearly resembles those of Egypt, that M. Geoffroy could not distinguish them without great difficulty. This crocodile is also attacked by the *gnats*, from which he would have no means of delivering himself, (his tongue like that of the crocodile of the Nile being fixed) if a bird of a particular species did not give him the same assistance that the crocodile of the Nile receives from the little plover. These facts explain the passage in Herodotus, and demonstrate that the animal which is there called *bdella* is not a *leech*, but a flying insect, similar to our *gnat*.

THE WOODPECKER.

Dr. Walsh, in his *Journey from Constantinople*, describes a species of woodpecker, about the size of a thrush, of a light, blue colour, with black marks beside the bill. "It entered my room," says he, "with all the familiarity of an old friend, hopped on the table, and picked up the crumbs and flies. It had belonged to the doctor's child, just buried, and by a singular instinct, left the house of the dead, and flew into my room. Its habits were curious, and so familiar, that they were quite attractive; it climbed up the wall by any stick or cord near it, devouring flies. It sometimes began at my foot, and at one race, ran up my leg, arm, round my neck, down my other arm, and so to the table. It there tapped with its bill with a noise as loud as a hammer. This was its general habit on the wood in every part of the room; when it did so, it would look intently at the place, and dart at any fly or insect it saw running. Writers on Natural History say it makes this noise to disturb the insects concealed within, so to seize them when they appear."

THE BISÇACHO, OR COQUIMBO OWL.

This bird, Capt. Head observes, is found all over the plains of the Pampas. Like rabbits, they live in holes, which are in groups in every direction, and which make galloping over these plains very dangerous. These animals are never seen in the day; but, as soon as the lower limb of the sun reaches the horizon, they are seen issuing from their holes in all directions, which are scattered in groups like little villages all over the Pampas. The biscachos, when full-grown, are nearly as big as badgers, but their head resembles a rabbit's, except that they have large bushy whiskers. In the evening they sit outside their holes, and they all appear to be moralising. They are the most serious-looking animals I ever saw; and even the young ones are grey-headed, have mustachios, and look thoughtful and grave. In the daytime, their holes are guarded by two little owls, who are never an instant away from their posts As one gallops by these owls they always stand looking at the stranger, and then at each other, moving their old-fashioned heads in a manner which is quite ridiculous; until one rushes by them, when fear gets the better of their dignified looks, and they both run into the biscacho's hole.*

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* Rough Notes.

TEMPERATURE OF THE INTERIOR OF THE EARTH.

Mr. Cordier, in a paper on this subject, draws the following conclusions:—

1. Our experiments fully confirm the existence of a subterranean heat, which is peculiar to the terrestrial globe, does not depend on the solar rays, and increases rapidly with the depth. 2. The increase of the subterranean heat does not follow the same law over the whole earth; it may be twice or three times as much in one country as in another. 3. These differences are not in constant relation, either with the latitudes or longitudes. 4. Lastly, The increase is certainly more rapid than has been supposed; it may go so high as a degree for every 15 or even 13 metres, in certain countries: provisorily the mean term cannot be fixed at less than 25 metres. These important conclusions, M. Cordier remarks, fix the bases, at the same time modifying them considerably, according to which the mathematical theory of the dispersion of heat, in bodies of large dimensions, may be applied to the earth. They are in harmony with the inferences derived from phenomena, of so very different a nature, which have long afforded evidence of the internal incandescence of the earth. Brought into mutual connexion, these different elements give rise to new combinations, and to remarkable applications. In our opinion, there may be elicited from them numerous inductions, calculated to throw light on the most obscure, and, at the same time, the most essential parts of geology.*

STUPENDOUS LIZARD.

Mr. Bullock, in his Travels (lately published,) relates, that he saw near New Orleans, "what are believed to be the remains of a stupendous crocodile, and which are likely to prove so, intimating the former existence of a lizard at least 150 feet long; for I measured the right side of the under jaw, which I found to be 21 feet along the curve, and 4 feet 6 inches wide; the others consisted of numerous vertebræ, ribs, femoral bones, and toes, all corresponding in size to the jaw; there were also some teeth; these, however, were not of proportionate magnitude. These remains were discovered a short time since, in the swamp near Fort Philip, and the other parts of the mighty skeleton are, it is said, in the same part of the swamp."

GROWTH OF HAIR.

The following circumstance is recorded in a medical journal, as having occurred in Germany. A man, between twenty and thirty years of age, of a strong and healthy constitution, having short curly, and coarse hair, of a dark brown colour, found himself becoming bald. Numerous and large bald spots appeared on the head, and gradually increased until it became perfectly bare; and as the eyelashes fell out, the man had quite a singular and disagreeable appearance. When the head was closely examined, a short white and scattered down, very similar to a slight degree of mouldiness, was perceptible. At first it was hoped that the hair would grow again; but the sequel proved the contrary. After two years, Dr. Radimacher advised him to pour French brandy upon sulphate of copper, and when it had remained a few days, to wash the bald parts once a-day with the solution. In eight days the hair had began to grow, and in four months it equalled the original growth in quantity, but was of a lighter colour, crisp, dry, and stiff, and had not a natural appearance. A spot still remained bald on the back of the head. The eye-brows and lashes grew again, like the rest of the hair. A year after this the man shed his hair again, but the eye-brows and lashes remained. Dr. Radimacher wished him now to wait awhile, to ascertain whether the hair would or would not grow again spontaneously; but the patient would not and had recourse to the solution, which produced another growth of bland or light hair; and the spot which had continued bald, notwithstanding the solution, became covered in common with the other parts of the head. This growth had a much more natural appearance than the former one.*

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* Jameson's. Journal.

EARTHQUAKES IN 1827.

THE following list of earthquakes, which occurred in the year 1827 in different parts of the world, has appeared in a foreign journal:—January 2. At Mortagne (Orne) and its environs: a violent shock, of short duration, accompanied with an intense noise. Chimneys and household furniture were thrown down; the commotion reached as far as Alençon; the day was cloudy, the weather thick and stormy, which is unusual at that time of the year.—February 9. At seven o'clock in the evening, in the north-west part of Wales, and the Isle of Anglesea. The shocks continued from forty seconds to a minute; they were sufficiently violent to overturn several pieces of furniture. A noise was heard, like that of a heavy-laden cart going on the stones.—April 2. At Beverss, at twenty minutes past one in the morning, two strong consecutive shocks. The inhabitants of Basse Engadine assert, that they counted twenty similar shocks during the winter.—May 29. At Vajaca, in Mexico, two slight shocks.—June 3. At Martinique, a slight shock.—June 12. At Tehenecan, in Mexico, at half-past one o'clock, a violent shock, with a frightful noise; many buildings damaged.—June 16. At Aquila, in the kingdom of Naples, a shock, at five o'clock in the morning.—June 21. At Palermo, at eleven in the morning, four strong shocks in the space of seven seconds; it was an oscillatory motion from the west to the east.—August 14. At Palermo, at two P. M., several shocks; they continued about eighteen minutes, with very short intervals; the motion was always oscillatory.—September 18. At Lisbon, a slight shock.—October 10. At Zurich, and all the shores of the lake, at twelve minutes before three P. M., a strong shock. —October 15. At Jassy, at eight in the evening, two violent shocks, directed from north to south, and accompanied by a subterraneous noise; two or three days after, the heat was very great.—October 30. At Corsica, in the cantons of Taravo, Tagliano, and Sartene, two shocks, at twenty minutes past five A. M. —November 30. At Pointe-à-Petre, Guadaloupe, at three in the evening, a violent earthquake. At Mariegalante it was preceded by a strong and sudden storm.

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* Monthly Mag.

LARGE WALNUT TREE.

THE trunk of a walnut tree, 12 feet in diameter, hollowed out and furnished as a sitting-room, has lately been imported from America, and exhibited in London. A printed paper, delivered to spectators, states the tree to have been uparalleled in size and beauty, the trunk 80 feet high, without a branch, and the entire height 150 feet. The bark was 12 inches thick, and the branches from 3 to 4 feet in diameter. It grew at the junction of the Silver and Walnut creeks, on the south shore of Lake Erie, in the state of New York.*

TREATMENT OF GOLD AND SILVER FISH.

THESE beautiful objects of the animal kingdom, though long ago introduced into Europe from China, their native country, seldom breed in such numbers as they might be expected to do. It has been lately discovered that in ponds heated by the waste water discharged from steam factories, the gold and silver fish breed abundantly. From this circumstance, it has been suggested, that, as heating hot-houses by warm water is now so generally adopted, a portion of this, led occasionally into a garden basin, would keep the water in such a temperament as would not only always be agreeable to the fish, but promote their breeding.†

ENORMOUS WHALE.

THE skeleton of a whale, 95 feet long by 18 feet high, has lately been deposited in the Cabinet of Natural History at Ghent. In the opinion of many naturalists, among whom is M. Cuvier, this fish could not have been less than 900 or 1,000 years old!

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* Mag. Nat. Hist. † Gardener's Mag.

SUPERSTITION RELATING TO BEES.

The superstitious practice of informing bees of any death that takes place in a family, is very well known, and still prevails among the lower orders in this country. The disastrous consequence to be apprehended from noncompliance with this strange custom is that the bees will dwindle and die. The manner of communicating the intelligence to the little community, with due form and ceremony is this: to take the key of the house, and knock with it three times against the hive, telling the inmates, at the same time, that their master or mistress, &c., (as the case may be) is dead! Mr. Loudon says, when in Bedfordshire, lately, we were informed of an old man who sang a psalm last year in front of some hives which were not doing well, but which, he said, would thrive in consequence of that ceremony. Our informant could not state whether this was a local or individual superstition.*

A DOG-FACED BABOON

Died in February last, in the Tower, after having attracted a great deal of attention during its residence in that establishment, by its extraordinary resemblance to humanity, not only in form and appearance, but also in its manners and habits. The right arm, in particular, exhibited a singular likeness to the corresponding part of the human figure; so much so, indeed, that had it not been for its hairy covering, and the somewhat unusual length of the fingers, the eye, at least, might almost have mistaken it for a portion of some brawny blacksmith or hero of the ring. Our deceased friend, we understand, used, at all events, to brandish his pot of porter by its assistance, in a style that would have done honour to any of us; and would swill it off, apparently with quite a human relish. His attentions to a dog that used to be a frequent visitor at his cage, were, we are told, in the very best style of dignified patronising; nor did the little favourite seem to recognise any difference between the pat of his brother quadruped's paw, and that of the whiter-skinned and shorter-fingered animal. This jolly tippler, however, "life's idle business o'er," sunk at last under a confirmed dropsy, the effect, we fear, of his plentiful potations, leaving only the memory of his fate as a warning to all surviving debauchees.†

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* Mag. Nat. Hist. † Verulam.

RARE INSECTS.

There exists in Livonia, a very rare insect, which is not met with in more northern countries, and whose existence was for a long time considered doubtful, called the *Furia Infernalis*. It is so small that it is very difficult to distinguish by the naked eye; and its sting produces a swelling, which, unless a proper remedy be applied, proves mortal.

During the hay harvest, other insects named *Meggar*, occasion great injury both to men and beasts. They are of the size of a grain of sand. At sunset they appear in great numbers, descend in a perpendicular line, pierce the strongest linen, and cause an itching, and pustules, which if scratched, become dangerous. Cattle, which breathe these insects, are attacked with swellings in the throat, which destroy them, unless promptly relieved.

WHITE CATS.

In a recent number of *Loudon's Gardener's Magazine*, it is stated that white cats with blue eyes are always deaf, of which extraordinary fact there is the following confirmation in the *Magazine of Natural History*, No. 2; likewise conducted by Mr. Loudon:—Some years ago a white cat of the Persian kind (probably not a thorough-bred one) procured from Lord Dudley's at Hindley, was kept in a family as a favourite. The animal was a female, quite white, and perfectly deaf. She produced, at various times, many litters of kittens, of which generally, some were quite white, others more or less mottled, tabby, &c. But the extraordinary circumstance is, that of the offspring produced at one and the same birth, such as, like the mother, were entirely white, were, like her, invariably deaf; while those that had the least speck of colour on their fur, as invariably possessed the usual faculty of hearing.

CEDARS OF LEBANON.

Mr. Wolff, the missionary, counted on Mount Lebanus, 13 large and ancient cedars, besides numerous small ones, in the whole 387 trees. The largest of these trees was about 15 feet high, not one-third of the height of hundreds of English cedars; for instance, those of Whitton, Pain's Hill, Caenwood, and Juniper Hall, near Dorking.*

HIPPOPOTAMUS.

The head of a Hippopotamus has recently been brought to England, with all the flesh about it, in a high state of preservation. This amphibious animal was harpooned while in combat with a crocodile, in a lake in the interior of Africa. The head measures near 4 feet long, and 8 feet in circumference: the jaws open 2 feet wide, and the cutting-teeth, of which it has four in each jaw, are above a foot long, and four inches in circumference. Its ears are not bigger than a terrier's, and are much about the same shape. This formidable and terrific creature, when full-grown, measures about 17 feet long from the extremity of the snout to the insertion of the tail, above 16 feet in circumference round the body, and stands above 7 feet high. It runs with astonishing swiftness for its great bulk, at the bottom of lakes and rivers, but not with as much ease on land. When excited, it puts forth its full strength, which is prodigious. "I have seen," says a mariner, as we find it in Dampier, "one of these animals open its jaws, and seizing a boat between its teeth, at once bite and sink it to the bottom. I have seen it on another occasion place itself under one of our boats, and rising under it, overset it with six men who were in it, but who, however, happily received no other injury." At one time it was not uncommon in the Nile, but now it is no where to be found in that river, except above the cataracts.*

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* The Mirror.

EELS.

THE problem of the generation of eels is one of the most abstruse and curious in natural history; but we have been much pleased, and not a little informed, by some observations on the subject in Sir Humphry Davy's delightful little volume, *Salmonia;* of which the following is the substance:—

Although the generation of eels occupied the attention of Aristotle, and has been taken up by the most distinguished naturalists since his time, it is still unsolved. Lacepède, the French naturalist, asserts, in the most unqualified way, that they are *viviparous;* but we do not remember any facts brought forward on the subject. Sir Humphry then goes on to say—This is certain, that there are two migrations of eels—one up and one down rivers, one *from* and the other *to* the sea; the first in spring and summer, the second in autumn or early in winter. The first of very small eels, which are sometimes not more than two or two and a half inches long: the second of large eels, which sometimes are three or four feet long, and which weigh from 10 to 15, or even 20 lbs. There is great reason to believe that all eels found in fresh water are the results of the first migration; they appear in millions in April and May, and sometimes continue to rise as late even as July and the beginning of August. I remember this was the case in Ireland in 1823. It had been a cold, backward summer; and when I was at Ballyshannon, about the end of July, the mouth of the river, which had been in flood all this month, under the fall, was blackened by millions of little eels, about as long as the finger, which were constantly urging their way up the moist rocks by the side of the fall. Thousands died, but their bodies remaining moist, served as the ladder for others to make their way; and I saw some ascending even perpendicular stones, making their road through wet moss, or adhering to some eels that had died in the attempt. Such is the energy of these little animals, that they continue to find their way in immense numbers to Loch Erne. The same thing happens at the fall of the Bann, and Loch Neagh is thus peopled by them; even the mighty Fall of Shaffausen does not prevent them from making their way to the Lake of Constance, where I have seen many very large eels. There are eels in the Lake of Neufchatel, which communicates by a stream with the Rhine; but there are none in the Lake of Geneva, because the Rhone makes a subterraneous fall below Geneva; though small eels can pass by moss or mount rocks, they cannot penetrate limestone rocks, or move against a rapid descending current of water, passing, as it were, through a pipe. Again: no eels mount the Danube from the Black Sea; and there are none found in the great extent of lakes, swamps, and rivers communicating with the Danube—though some of these lakes and morasses are wonderfully fitted for them, and though they are found abundantly in the same countries, in lakes and rivers connected with the ocean and the Mediterranean. Yet, when brought into confined water in the Danube, they fatten and thrive there. As to the instinct which leads young eels to seek fresh water, it is difficult to reason; probably they prefer warmth, and, swimming at the surface in the early summer, find the lighter water warmer, and likewise containing more insects, and so pursue the courses of fresh water, as the waters from the land, at this season become warmer than those from the sea. Mr. J. Couch, in the Linnæan Transactions, says the little eels, according to his observation, are produced within reach of the tide, and climb round falls to reach fresh water from the sea. I have sometimes seen them in spring, swimming in immense shoals in the Atlantic, in Mount Bay, making their way to the mouths of small brooks and rivers. When the cold water from the autumnal flood begins to swell the rivers, this fish tries to return to the sea; but numbers of the smaller ones hide themselves during the winter in the mud, and many of them form, as it were masses together. Various authors have recorded the migration of eels in a singular way; such as Dr. Plot, who, in his History of Staffordshire, says they pass in the night across meadows from one pond to another; and Mr. Arderon, in the Philosophical Transactions, gives a distinct account of small eels rising up the flood-gates and posts of the water-works of the city of Norwich; and they made their way to the water above, though the boards were smooth planed, and 5 or 6 feet perpendicular. He says, when they first rose out of the water upon the dry board, they rested a little—which seemed to be till their slime was thrown out, and sufficiently glutinous—and then they rose up the perpendicular ascent with the same facility as if they had been moving on a plane surface.—There can, I think, be no doubt that they are assisted by their small scales, which, placed like those of serpents, must facilitate their progressive motion; these scales have been microscopically observed by Lewenhoeck. Eels migrate from the salt water of different sizes, but I believe never when they are above a foot long—and the great mass of them are only from two and a half to four inches. They feed, grow, and fatten in fresh water. In small rivers they seldom become very large; but in large, deep lakes they become as thick as a man's arm, or even leg; and all those of a considerable size attempt to return to the sea in October or November, probably when they experience the cold of the first autumnal rains. Those that are not of the largest size, as I said before, pass the winter in the deepest parts of the mud of rivers and lakes, and do not seem to eat much, and remain, I believe, almost torpid. Their increase is not certainly known in any given time, but must depend upon the quantity of their food; but it is probable they do not become of the largest size from the smallest in one or even two seasons; but this, as well as many other particulars, can only be ascertained by new observations and experiments. Block states, that they grow slowly, and mentions that some had been kept in the same pond for fifteen years. As very large eels, after having migrated, never return to the river again, they must (for it cannot be supposed that they all die immediately in the sea) remain in salt water; and there is great probability that they are then confounded with the conger, which is found from a few ounces to one hundred pounds in weight.

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* Mag. Nat. Hist.

OSTRICHES

Impart a lively interest to a ride in the Pampas. They are sometimes seen in coveys of twenty or thirty, gliding elegantly along the undulations of the plain, at half pistol-shot from each other, like skirmishers. The young are easily domesticated, and soon become attached to those who caress them; but they are troublesome inmates; for, stalking about the house, they will, when full grown, swallow coin, shirt-pins, and every small article of metal within reach. Their usual food, in a wild state, is seeds, herbage, and insects; the flesh is a reddish brown, and if young, not of bad flavour. A great many eggs are laid in the same nest. Some accounts exonerate the ostrich from being the most stupid bird in the creation. This has been proved by the experiment of taking an egg away, or by putting one in addition. In either case she destroys the whole by smashing them with her feet. Although she does not attend to secrecy, in selecting a situation for her nest, she will forsake it if the eggs have been handled. It is also said that she rolls a few eggs thirty yards distant from the nest, and cracks the shells, which, by the time her young come forth, being filled with maggots, and covered with insects, form the first repast of her infant brood. The male bird is said to take upon himself the rearing of the young. If two cock-birds meet, each with a family, they fight for the supremacy over both; for which reason an ostrich has sometimes under his tutelage broods of different ages.*

THE AIR PLANT.

PRINCE LEOPOLD has succeeded in bringing to perfection that exotic, the air plant. It is suspended from the ceiling, and derives its nourishment entirely from the atmosphere.

IMMENSE MEDUSA.

A SPECIES of sea serpent was thrown on shore near Bombay in 1819. It was about 40 feet long, and must have weighed many tons. A violent gale of wind threw it high above the reach of ordinary tides; in which situation it took nine months to rot; during which process travellers were obliged to change the direction of the road for nearly a quarter of a mile, to avoid the offensive effluvia. It rotted so completely that not a vestige of bone remained.†

HIMALAYA MOUNTAINS.

CAPT. GERARD, in exploring these mountains, with a view to measurement, has ascended to the height of 19,600 feet, being 400 feet higher than Humboldt ascended on the Andes. The latter part of Capt. Gerard's ascent, for about two miles, was on an inclined plane of 42°, a nearer approach to the perpendicular than Humboldt conceived it possible to climb for any distance together.‡

MONT BLANC.

THE height of Mont Blanc and of the Lake of Geneva has lately been carefully ascertained by M. Roger, an officer of engineers in the service of the Swiss Confederation. The summit of the mountain appears to be 4,435 metres, 14,542 English feet above the Lake of Geneva, and the surface of the Lake 367 metres, or 1,233 English feet above the sea. The mountain is therefore, 15,775 feet above the level of the sea.

THE ICHNEUMON FLY.

THERE are several species of ichneumon which make thinnings among the caterpillars of the cabbage butterfly. The process of one species is this: while the caterpillar is feeding, the ichneumon fly hovers over it, and, with its piercer, perforates the fatty part of the caterpillar's back in many places, and in each deposits an egg, by means of the two parts of the sheath uniting together, and thus forming a tube down which the egg is conveyed into the perforation made by the piercer of the fly. The caterpillar, unconscious of what will ensue, keeps feeding on, until it changes into a chrysalis; while in that torpid state, the eggs of the ichneumon are hatched, and the interior of the body of the caterpillar serves as food for the caterpillars of the ichneumon fly. When these have fed their accustomed time, and are about to change into the pupa state, they, by an instinct given them, attack the vital part of the caterpillar (a most wonderful economy in nature, that this process should be delayed until they have no more occasion for food.) They then spin themselves minute cases within the body of the caterpillar; and instead of a butterfly coming forth (which if a female, would have probably laid six hundred eggs, thus producing as many caterpillars, whose food would be the cabbage,) a race of these little ichneumon flies issues forth, ready to perform the task assigned them, of keeping within due limits those fell destroyers of our vegetables.*

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* Memoirs Gen. Miller. † Jamaica Journ. ‡ Heber's India.

SENSITIVE PLANT.

On June 6, at the Royal Institution, Mr. Burnet gave an illustrated account of the experiments recently made by himself and Mr. Mayo, on the irritability of the sensitive plant, and extended his observations to the irritability and supposed nervous structure of plants in general. Their experiments accord with those of Dutrochet, as far as the two series run parallel. When a sensitive plant has been made to droop, Mr. Burnet finds that if the part in which the moving power resides is blackened so as to absorb the light of the sun, the restoration of the plant to its natural state is very much longer before it takes place. He also found that at the moment the expansion at the foot of the leaflets or other parts were touched to produce the motion of the plant, it changed colour.†

LIVING GIRAFFES IN EUROPE.

Besides the two living giraffes at present in Europe, at Windsor and Paris, a third has been sent by the Pacha of Egypt to the Emperor of Austria, and arrived some time since at Venice, accompanied by Arabs as keepers, and cows to provide its food. It was to pass the winter in Padua, and then proceed in the fine weather to Vienna.

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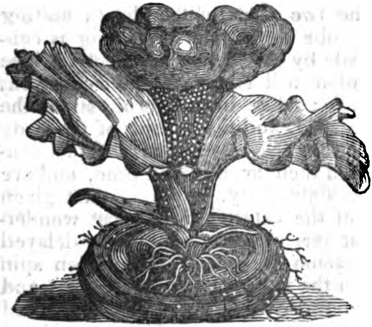
* Mr. Carpenter.—Gill's Repos.

† Phil. Mag.

CURIOUS PLANT.



The *Engraving* shows the *Arum Capanulatum*, an extraordinary plant, brought from Java and Madagascar, to Bury Hill, where it flowered in the hot-house. "On the continent of India, and in the Archipelago and Northern Circars, it is cultivated and valued as the potatoe is with us, and as the yam is in the West Indies. The roots often weigh from 4 to 8 lbs., and often more, each." They are compressed tubers, from each of which is produced a large leaf, from 1½ to 2 feet high. The flower appears at a different season from the leaf, and is very large and showy. From the top of the tuber arises a short, green, spotted stem, or peduncle, bearing a very large spathe, containing a spadix 10 inches high, its lower half covered with pistils of a bright yellow, and its top expanding into a large, waved, deep purple, granulated head.*

SYSTEMATIC ARRANGEMENT OF ACARIDES.

M. **Heyden** has undertaken the very difficult task of arranging the family of acarides, or mites, a group of animals which are frequently most important to be understood by the rural cultivator as well as by the naturalist. M. Heyden divides them into 69 genera, the greater part of them new. It would be well if the author would give specific descriptions, accompanied by good figures, of each of these genera.

FLOATING ISLAND.

From the earliest times, there are to be found in authors, notices of the singular geological phenomena of floating islands. Pliny tells us of the floating islands of the Lago de Bassanello, near Rome; in Lochlomond, in Scotland, there is, or was a floating island; and in the lake of Derwent Water, in Cumberland; such islands appear and disappear at indefinite periods. Mr. A. Pettingal, jun., has recently described a floating island, about a mile southwards of Newbury port, 140 poles in length, and 120 in breadth. It is covered with trees; and in summer, when dry weather is long continued, it descends to the bottom of the lake.†

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* Gardener's Mag.

† American Journ. of Science.

DOUBTFUL DISCOVERIES.

It may serve in some measure, to confirm M. Dutrochet's recent opinion of the non-existence of microscopic animalculæ, that the celebrated Spallanzani persuaded himself that he could see Animàlculæ infusòriæ which could be seen by nobody else. He attributed his own superiority of vision, in this respect, to long practice in using the microscope. The philosopher exulted in his enviable distinction, when a peasant, to whom he showed his animulculæ, could perceive nothing but muddy water.*

OPIUM

Has been recently cultivated to a considerable extent in England, particularly by a Mr. Young, and Messrs. Cowley and Staines of Winslow; and, among physicians and surgeons, the English opium is considered to be superior to the best Turkey and East India opium.†

HAWKING.

Professional falconers have been for many years natives of the village of *Falconsward*, near Bois le Duc, in Holland. A race of them was there born and bred, whence supplies have been drawn for the service of all Europe; but as there has been no sufficient inducement for the young men to follow the employment of their forefathers, numbers are dead or worn out; and there only remains John Pells, now in the service of John Dawson Downes, Esq., of Old Gunton Hill, Suffolk.

The hawks which have been trained for the field, are the slight falcon and the goshawk, which are the species generally used in falconry. The former is called a long-winged hawk, or one of the *lure;* the latter a short-winged hawk, or one of the *fist*.

The Icelander is the largest hawk that is known, and highly esteemed by falconers, especially for its great powers and tractable disposition. The gyr falcon is less than the Icelander, but much larger than the slight falcon. These powerful birds are flown at herons and hares, and are the only hawks that are fully a match for the fork-tailed kite. The merlin and hobby are both small hawks, and fit only for small birds, as the blackbird, &c. The sparrow-hawk may be also trained to hunt: his flight is rapid for a short distance, kills partridges well in the early season, and is the best of all for landrails.

The slight falcon takes up his abode every year, from October and November until the spring, upon Westminster Abbey, and other churches in the metropolis. This is well known to the London pigeon-fanciers, from the great havoc they make in their flights.‡

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* Mag. Nat. Hist. † Mech. Mag. ‡ Sir John Sebright.

THE PAR.

Our readers are doubtless aware that the par has been recently supposed, by very competent judges, to be the young of the salmon. Sir Humphry Davy is of an opposite opinion, as appears from the following extract from his *Salmonia*:—

"I think," says he, "the par, samlet, or brandling, common to most of our rivers which communicate with the sea, has a claim to be considered a distinct species; yet the history of this fish is so obscure, and so little understood, that I, perhaps, ought not to venture to give an account of it. I have seen this fish in the rivers of Wales and Herefordshire, and have heard it asserted, on what appeared good authority, that it was a mule—the offspring of a trout and a salmon. This opinion was supported by the fact, that it is found only in streams which are occasionally visited by salmon; yet I think it more probable, if it is a mixed race, that it is produced by the sea trout and common trout. In a small river which runs into the May near Ballina, in Ireland, I once caught, in October, a great number of small sea trout, which were generally of half a pound in weight, and which were all males; and unless it be supposed that the females were in the river likewise, and would not take the fly, these fish, in which the spermatic system was fully developed, could only have impregnated the ova of the common river trout. The sea trout and river trout are indeed so like each other in character, that such a mixture seems exceedingly probable; but I know no reason why such mules should always continue small, except that it may be a mark of impregnation. The only difference between the par and the common small trout is in the colour, and in its possessing one or two spines more in the pectoral fin. The par has *large blue or olive-bluish marks* on the scales, as if they had been made by the impression of the fingers of a hand; and hence the fish is called in some places *Fingerlings*. The river and sea trout seem capable of changing permanently their places of residence; and sea trout seem often to become river trout. In this case they lose their silvery colour, and gain more spots; and in their offspring these changes are more distinct. Fish likewise which are ill-fed remain small, and pars are exceedingly numerous in those rivers where they are found, which are never separated from the sea by impassable falls; from which I think it possible that they are produced by a cross between sea and river trout."

AERIAL VOYAGES OF SPIDERS.

By John Murray, Esq., F.S.A.

The number of the aëronautic spiders occasionally suspended in the atmosphere, says Mr. Murray, I believe to be almost incredible, could we ascertain their amount. I was lately walking with a friend, and noticed that there were four of these insects on his hat, at the moment there were three on my own; and from the rapidity with which they covered its surface with their threads, I cannot doubt that they are chiefly concerned in the production of that tissue which intercepts the dew, and which, illuminated by the morning sun, "glitters with gold, and with rubies and sapphires." Indeed, I have noticed that, when the frequent descent of the aëronautic spider was determined, a newly rolled turnip field was, in a few hoürs, overspread by a carpet of their threads. It may be remarked that our little aëronaut is very greedy of moisture, though abstemious in other respects. Its food is perhaps peculiar, and only found in the superior regions of the sky. Like the rest of its tribe, it is doubtless carnivorous, and may subserve some highly important purpose in the economy of Providence; such, for instance, as the destruction of that truly formidable, though almost microscopically minute insect, the Fùria infernàlis, whose wound is stated to be mortal. Its existence has been indeed questioned, but by no means disproved; that, and some others, injurious to man, or to the inferior creation, may be its destined prey, and thus our little aëronaut, unheeded by the common eye, may subserve an important good.

Mr. Bowman, F.L.S., says, "We arrested several of these little aëronauts in their flight, and placed them on the brass gnomon of the sundial, and had the gratification to see them prepare for, and recommence, their aërial voyage. Having crawled about for a short time, to reconnoitre, they turned their abdomens from the current of air, and elevated them almost perpendicularly, supporting themselves solely on the claws of their fore legs, at the same instant shooting out four or five, often six or eight, extremely fine webs, several yards long, which waved in the breeze, diverging from each other like a pencil of rays, and strongly reflecting the sunbeams. After the insects had remained stationary in this apparently unnatural position for about half a minute, they sprang off from the stage with considerable agility, and launched themselves into the air. In a few seconds after they were seen sailing majestically along, without any apparent effort, their legs contracted together, and lying perfectly quiet on their backs, suspended from their silken parachutes, and presenting to the lover of nature a far more interesting spectacle than the balloon of the philosopher. One of these natural aëronauts I followed, which, sailing in the sunbeams, had two distinct and widely diverging fasciculi of webs, and their position in the air was such, that a line uniting them would have been at right angles with the direction of the breeze."*

RED VIPER OF DORSETSHIRE.

The Rev. Mr. Rackett states that a serpent, known to the gamekeepers of Dorsetshire under the name of the red viper, was recently killed in Cranbourn Chase. It does not appear to have been previously known to British naturalists, and is considered to be more poisonous than the common viper, but, fortunately, very rare. Mr. Racket describes it as of a marked red colour, and thinks it probably the Coluber Chersea of Linnæus.*

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* Mag Nat. Hist.

CHARACTERISTICS OF FELINE ANIMALS.

ANIMALS of the cat kind are, in a state of nature, almost continually in action both by night and by day. They either walk, creep, or advance rapidly by prodigious bounds; but they seldom run, owing, it is believed, to the extreme flexibility of their limbs and vertebral column, which cannot preserve the rigidity necessary to that species of movement. Their sense of sight especially during twilight, is acute; their hearing very perfect. and their perception of smell less so than in the dog tribe. Their most obtuse sense is that of taste; the lingual nerve in the lion, according to Des Moulins, being no larger than that of a middle-sized dog. In fact, the tongue of these animals is as much an organ of mastication as of taste; its sharp and horny points, inclined backwards, being used for tearing away the softer parts of the animal substances on which they prey. The perception of touch is said to reside very delicately in the small bulbs at the base of the mustachios.†

BROWN HORNET OF NEW SOUTH WALES.

IN No, 8 of *Jameson's Philosophical Journal*, are some interesting observations on the large brown hornet of New South Wales, which were read before the Wernerian Natural History Society, January 12th, 1828. This insect has a beautiful appearance in the living state, having a number of yellowish-brown segments, on a black ground, around his body; his legs and wings being of the same colour; a fine yellowish colour presents itself on each shoulder, at the root of the wings, and there is a yellow stripe on the forehead. The rest of the body is a beautiful velvet-black; and the tips of the wings are tinged with a light purple colour. It has six legs, the two first of which it uses with great dexterity as hands. They may be seen frequently rubbing them, and thrusting their foot into their mouth, to besmear it with an unctuous substance, which may enable it to seize a firmer hold of its object.

It is from the structure of the fore-legs, which are admirably adapted for the purpose, that, it is supposed the hexagonal cells derive their character of regularity. When the sun is hot, you may see the insect traversing round his cell, seizing the edge of it in his mouth, and adding a small piece to the sides. When he has done this, he sets his body close to a side, and clasping the cell firmly in his fore-arms, he continues rubbing it upwards and downwards for a considerable time; and as one cell is always a little higher than the one next it, he proceeds thus from side to side, and gives a six-sided form simply by rubbing and working upon the soft materials with his arms. A very little attention will show, too, that he can give it no other form than this or the circle. For his arms are so constructed, that if he acts uniformly upon any of these sides or angles, as we have repeatedly seen him do, he must form a hexagonal figure, if the materials are pliant.

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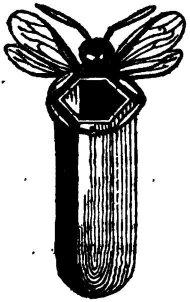
* New Monthly Mag.

† Wilson's Illustrations of Zoology.



The arms are first composed of a joint near the body, extending a little outward, and movable in every direction. To this is attached the arm, which is smooth, and somewhat powerful. Next this is the fore-arm, and next it are the feet, which have three hooks, a small one on each side, and a larger in front. Between each of these is a powerful joint, and they are confined to a large angle, as they cannot be extended into a straight line. When the animal, therefore, has made the sides of his cell in a circular shape by the gluten from his mouth, and a quantity of pipe-clay, which he frequently employs in the building of it, he applies his body to it, and, placing the fore-arms around it, at an angle most convenient for itself, he continues to rub up and down till the shape has been given to the cell. The first angle is formed by the body and the arm; the second by the arm and fore-arm, and the third on each side by the angles formed by the fore-arm, and the feet or claws.*

In proof of this, it may be remarked, that the bottom of the cells is round, and the hexagonal form does not commence till the cell has attained a sufficient height to admit of the application of the animal's body and legs to the outside of the cell, after which, to the top of the cell, the hexagonal form is remarkably distinct. Besides, to leave no doubt about the matter, we have measured the legs of a full grown hornet, and then applied them to the sides of the cells, and out of 160 cells in one nest, found only half a dozen near the outside that did not correspond exactly with the length of the arm or fore-arm, and these were probably injured or dried up.

MECHANISM OF THE NECK IN BIRDS.

The contrivance by which the spine of animals is rendered susceptible of varied motion, is by means of a strong chain of bones

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* The figure is larger than nature.

(vertebræ,) locked together by means of knobs and projections to prevent dislocation, a chain which stretches from the head to the extremity of the tail. Every body must have remarked, that in birds, the neck is more capable of varied motion than in quadrupeds; but it is not so commonly known, that this can be accounted for from the greater number of bones, and consequently, of joints, in the necks of birds. Except in the three-toed sloth, indeed, the bones in the neck of quadrupeds and of man are uniformly seven in number, the short-necked mole having the same as the long-necked giraffe; in birds, the number is never less than nine, and varies from that to twenty-four: facts, which, we think, are as interesting as they are curious.*

EXPERIMENTS ON VEGETATION.

The celebrated chemist, Professor Dobereiner of Jena, has made the following experiments on the vegetation of seeds. Two glass vessels were procured, each of the capacity of 320 cubic inches, and two portions of barley were sown in parts of the same earth, and moistened in the same degree; they were placed one in each vessel. The air was now exhausted in one, till reduced to the pressure of 14 inches of mercury; and condensed in the other, till the pressure equalled 56 inches. Germination took place in both nearly at the same time, and the leaflets appeared of the same green tint; but, at the end of fifteen days, the following differences existed:—The shoots in the rarefied air were 6 inches in length, and from 9 inches to 10 inches in the condensed air. The former were expanded, and soft; the latter rolled round the stem, and solid. The former were wet on their surface, and especially towards the extremities; the latter were nearly dry. I am disposed, says M. Dobereiner, to believe that the diminution in the size of plants, as they rise into higher regions on mountains, depends more on the diminution of pressure than of heat. The phenomena of drops of water on the leaves, in the rarefied air, calls to my mind the relation of a young Englishman, who, whilst passing through Spanish America as a prisoner, remarked that, on the highest mountains of the country, the trees continually transpired a quantity of water, even in the driest weather, the water falling sometimes like rain.†

FACULTIES OF BRUTES.

The dog is the only animal that dreams; and he and the elephant the only animals that understand looks; the elephant is the only animal that, besides man, feels *ennui;* the dog, the only quadruped that has been brought to speak. Leibnitz bears witness to a hound in Saxony, that could speak distinctly thirty words.‡

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* Mag. Nat. Hist

† Bibliotheque Univ.

‡ Medical Gazette.

ORIGIN OF JET.

In the Cabinet of Mineralogy in Languèdoc, M. Chaptal has preserved several pieces of wood, whose external part is in the state of jet, while the internal part still remains in the ligneous state; so that the transition from the vegetable to the mineral state may be distinctly observed. At Montpellier have been dug up, several cart-loads of trees converted into jet, with their original forms so perfectly preserved, that the species of trees thus bitumenised can often be determined. A specimen of jet from Vachery can be distinctly recognised, as retaining the texture of the walnut tree; and the texture of the beech can be traced in the jet from Bosrup, in Scania. The most singular instances, however, are those of a wooden pail and of a wooden shovel, which M. Chaptal, whose authority is undoubted, affirms to have been converted into pure jet.

SEA AIR.

The atmosphere, in the vicinity of the sea, usually contains a portion of the muriates over which it has been wafted. It is a curious fact, but well ascertained, that the air best adapted to vegetables is pernicious to animal life, and *vice versa.* Now, upon the sea-coast, accordingly, animals thrive, and vegetables decline.[*]

GRAIN AND BREAD FOUND IN AN EGYPTIAN TOMB.

M. PASSALACQUA having found a quantity of grain in an Egyptian tomb, it has been carefully examined by MM. Julia Fontenelle, Le Baillif, and Kunth, who have determined it to be common wheat (Triticum sativum.) M. Raspail, however, differs from those naturalists, and, by more minute examination, has satisfied himself that it is barley, which has been subjected to a considerable degree of heat; and, on torrefying some fresh barley, it assumed the same appearance with the Egyptian grain. Along with the grain was found some bread, apparently unleavened. M. Raspail supposed the tomb to be that of a high-priest, and refers to Leviticus ii. 14, 15, in which it is ordered to offer "green ears of corn, dried by the fire, even corn beat out of the full ear." Some Egyptian grain in the museum of Charles X., however, is certainly wheat, with some grains of torrefied barley mixed with it. Specimens of bread, in this museum, are similar to that found by M. Passalacqua.[†]

ALPINE PASTURE.

A SINGULAR fact in vegetation presents itself at the Glacier of Rocsosecco, which forms one of the branches of the Berneria, in

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[*] Harwood's Southern Coast.

[†] Bulletin des Science.

Switzerland. On its summit there is a valley nearly horizontal, filled with ice; on which the avalanches have brought down masses of earth. This earth, thus resting on a basis of ice, produces a number of Alpine plants, that supply abundant and nourishing food to the flocks of the inhabitants of Samaden. There are documents which prove, that this singular pasture has been used since the year 1536.*

MEAN HEIGHT OF THE INHABITANTS OF PARIS, &c.

During eight years, from 1816 to 1823 inclusive, the mean height of the young men found fit for military service has been 5 feet 2 inches 1-3 lines for Paris, and 5 feet 1 inch 9-1-3 lines for the suburbs de Sceaux and Saint-Denis; so that the mean height is higher in Paris than in the rest of the department de la Seine. The same fact has been remarked in the department du Rhone, between the town of Lyons and the suburb of Villefranche, in the years from 1806 to 1810 inclusive. From other facts of a similar nature also, it may be concluded that all other things being equal, the height of men is in proportion to their condition in life, or rather, perhaps, inversely, as the troubles, fatigue, and deprivations which occur in infancy and youth.†

INSECTS INCLOSED IN COPAL.

The insects contained in the different kinds of copal, which occur in commerce, are not less interesting than those inclosed in amber. M. Dalman has examined many of them very minutely, and has found,—1. That there is a complete analogy existing between these insects and those contained in amber. 2. That there are many new genera amongst them, and many new species of genera already known. 3. That some new points relative to the geography of insects may be deduced from them; for copal, which is always an exotic substance, contains insects belonging to genera which had been supposed to occur exclusively in Europe, such for instance as Pselaphus, Claviger, Aliochara, Chermes, Thrips, &c.

Copal resin perfectly preserves the most delicate part of the smallest insect, in consequence of which M. Dalman has been enabled to study the systematic characters of these small beings very minutely. He has made out three new genera and fifteen new species.‡

DESTRUCTION OF GRASSHOPPERS' EGGS.

Last year the Pacha of Egypt offered a reward, for all the grasshoppers' eggs that should be delivered to him, of 17 piastres per measure. By a letter from Acre, it appeared that in

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* Foreign Review. † Corr. Mathem. ‡ Bull. Univ.

October last 40 garavas of 72 measures each had been sent in. The total quantity of eggs, estimated as above, would be worth 46,000 piastres to those who collected them, or about £40,000.*

CUCKOO KEPT ALIVE IN CONFINEMENT FOR NEARLY A YEAR PAST.

This specimen was taken from the nest of a titlark, near the village of Currie, in the end of July 1827. It was then apparently about a fortnight old, and was not fully fledged until six weeks after. At first it was fed with bread and raw eggs made up into a paste. After this it was fed with roasted meat cut into small pieces; and ultimately with raw meat, which it prefers, but will not take unless perfectly fresh. At present it eats about a pound of meat weekly. It is very fond of insects of all kinds, and in autumn seemed to prefer the larvæ of butterflies. Its first moult commenced in the end of March last. Previous to this, the colour of the upper parts was deep brown, spotted with reddish-brown; the breast and belly greyish-white, with transverse bars of brown. During winter, it was dull through the day, and restless at night, flapping its wings for hours together. At present, it is active through the day, and quiet at night. About the beginning of March it was first heard to utter its peculiar cry, which it has repeated many times since; and one morning in the end of April it continued crying for a whole hour. Its chirping cry was given up about January. At present it has a sharp weak scream, which it utters on being frightened or irritated. It did not eat of itself until nearly three months after it was found. It has always been very fond of heat, and is extremely sensible to cold, shivering intensely when the temperature is low. When the sun shines upon it, it expands all its feathers, especially those of the tail and wings, turning its back to the heat. When eating, it holds the piece of meat about three or four seconds, squeezing it with the points of its mandibles, which is supposed to be an instinctive action, the object of which is to deprive its prey of life, previous to swallowing it. The late Mr. Templeton of Belfast succeeded in keeping a cuckoo over winter, but it died in March, when the first moult commenced.†

SNAKE CATCHERS.

The secret of rendering docile, and handling with impunity, the most venomous serpents, which has so long been in the possession of the inhabitants of Western India, is not unknown in China. It is observed that the native snake-catchers here rub their hands, previously to taking hold of the snake, with an antidote composed of pounded herbs. The virtue of the preparation is such, that they hold with the naked hand, and provoke fearlessly the deadly cobra-di-capello, or spectacle-viper, a serpent which, next to the rattle-snake of North America, is perhaps one of the most dangerous reptiles in existence. This serpent, in common with others of a similar nature, are not unfrequently met with in Canton in the possession of these men, who, for a trifling gratuity, exhibit them to the curious spectator.*

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* Asiatic Jour.

† Jameson's Jour.

THE EARWIG.

The name of this insect, in almost all European languages, has given it a character which causes a feeling of alarm even at the sight of it. Whether or not they ever did enter the human ear is doubtful,—that they might endeavour to do so, under the influence of fear, is more than probable; and this, perhaps, has been the origin of their name, and the universal prejudice against them. As it is said that anatomists deny the possibility of their deep or dangerous entrance into the ear, it is a pity that this is not generally known, as it might defend the constitutionally timid from unnecessary alarm, and give a more favourable idea of a part of animal creation, which forms a most necessary link in the chain of being.†

THE LEAF-MOON FISH OF CEYLON.

In Mr. Bennet's splendid work "The Fishes of Ceylon," is engraved and described a fish of very singular form, the body being broad and short; and two very large fins, one on the back, and another on the abdomen, give the whole outline somewhat the appearance of a broad crescent; in the centre of which the tail, short and fan-shaped, projects like a leaf, and hence the Ceylonese name of Kola Handah, the Leaf-Moon. The scientific name is Chætodon Vespertilio. It is rather a scarce fish, and being considered by the native fishers as unwholesome, from a sort of food to which it is partial, as well as the copper of ships, is never made use of.

DISEASE OF SILK-WORMS AND ITS CURE.

In the southern parts of France, where silk-worms are raised, it is very common to observe the insects attacked by a disease called the jaundice, in consequence of the colour acquired by them. Very careful examination is continually made for the discovery of such worms as may be attacked by it, that they may be removed, lest the disease, being contagious, should spread to the others.

The Abbé Eysseric of Carpentras had recourse to a remedy in these cases, which, though apparently dangerous, had been warranted by the success of twenty years. He used to powder his worms over with quick-lime by means of a silk sieve; he then gave them mulberry-leaves moistened with a few drops of wine, and the insects instantly set about devouring the leaves with an eagerness which they did not usually show. Not one of the hurdles upon which he raised his worms appeared infected wth the jaundice. It was at first supposed, that the cocoons of silk were injured by this process; this, however, is not the case, and his method of practice is now adopted generally in the department of Vaucluse.*

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* Canton Register. † Brande's Journ.

FLOATING VOLCANIC PRODUCTS.

FROM the *Journal du Havre*, July 20, 1827:—Capt. Le Sauvage, of the Bonne Emma, came in yesterday from Senegal, and says, that on the 29th of June, 1827, being about 20 leagues to the east of the Azores, he traversed a space three leagues in width, covered with volcanic stones, sugar canes, straw, and pieces of wood. He supposed these debris had been caused by the eruption of a volcano.

VEGETABLE ORIGIN OF SILK.

PART of the interior of the white mulberry is composed of a tissue of beautiful white fibres of silk, much resembling China silk, which would lead us to the inference that silk is a vegetable, not an animal product, that is to say, that the basis of the material, in its proximate form, is derived from the vegetable kingdom, though the spinning of its substance into a lengthened thread is entirely due to the mechanical functions of the silkworm. The silk tissue of the mulberry becomes very obvious by breaking some decayed twigs of two or three years' growth.†

ACCOUNT OF A FIGHT BETWEEN A TIGER AND AN ELEPHANT.

By George Finlayson, Esq.

IN the midst of a grassy plain, about half a mile long, and nearly as much in breadth, about sixty or seventy fine elephants were drawn up in several ranks, each animal being provided with a mahawat and a hauda, which was empty. On one side were placed convenient seats; the governor, mandarins, and a numerous train of soldiers being also present at the spectacle. A crowd of spectators occupied the side opposite. The tiger was bound to a stake placed in the centre of the plain, by means of a stout rope fastened round his loins. We soon perceived how unequal was the combat. The claws of the poor animal had been torn out, and a strong stitch bound the lips together, and prevented him from opening his mouth. On being turned loose from the cage, he attempted to bound over the plain; but, finding all attempts to extricate himself useless, he threw himself at length upon the grass, till, seeing a large elephant with long tusks approach, he got up and faced the coming danger. The elephant was by this attitude and the horrid growl of the tiger too much intimidated, and turned aside, while the tiger pursued him heavily, and struck him with his fore-paw upon the hind quarter, quickening his pace not a little.

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* Bull. Univ.

† Gard. Mag.

The mahawat succeeded in bringing the elephant to the charge again before he had gone far, and this time he rushed on furiously, driving his tusks into the earth under the tiger, and, lifting him up fairly, gave him a clear cast to the distance of about thirty feet. This was an interesting point in the combat. The tiger lay along on the ground as if he were dead, yet it appeared that he had sustained no material injury, for on the next attack he threw himself into an attitude of defence, and, as the elephant was again about to take him up, he sprung upon his forehead, fixing his hind-feet upon the trunk of the former.

The elephant was wounded in this attack, and so much frightened, that nothing could prevent him from breaking through every obstacle, and fairly running off. The mahawat was considered to have failed in his duty, and soon after was brought up to the governor with his hands bound behind his back, and on the spot received a hundred lashes of the rattan.

Another elephant was now brought, but the tiger made less resistance on each successive attack. It was evident that the tosses he received must soon occasion his death.

All the elephants were furnished with tusks, and the mode of attack in every instance, for several others were called forward, was that of rushing upon the tiger, thrusting their tusks under him, raising him, and throwing him to a distance. Of their trunks they evidently were very careful, rolling them cautiously up under the chin. When the tiger was perfectly dead, an elephant was brought up, who, instead of raising the tiger in his tusks, seized him with his trunk, and in general cast him to the distance of thirty feet.*

GLOBULES OF THE BLOOD.

M. Raspail states that the globules of the blood vary in diameter, according to the organs which supply the blood under examination, contrary to the general opinion, which considers their diameter as constant and invariable in every part of all individuals of the same species.†

NATURAL STOCKING PONDS ON HILLS WITH FISH.

The large water-beetle, which is in the habit of feeding upon the spawn of fish, occasionally in the evening climbs up the stems of rushes, &c. out of the water, sufficiently high to enable it to take wing; in these circumstances it has been caught, and, putting it into water, has been found to give out the spawn with which it had gorged itself previous to taking flight, both in a digested and undigested state; so that, on trial, it has been found that it produced fish of various kinds.*

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* Mission to Siam and Hue.

† Med. Jour.

THE NUTHATCH.

The Nuthatch (Sitta Europæa) is a little ash-coloured bird, rarely to be seen: it is thick in form, and heavily built, with large feet, scansorial, but not of that construction peculiar to perfect climbing birds, the toes being placed three forwards and one backwards: the beak is uncommonly large and strong for so small an animal, perfectly straight and somewhat wedge-shaped, exhibiting, when viewed laterally, much of the abrupt truncation so well adapted for breaking hard substances, to be observed in that of the woodpecker. He penetrates with facility the shells of nuts and extracts the kernel; he is most remarkable, however, for his habit of tapping, which is loud enough to be heard at a furlong distance. One of these little birds being wounded and caught, was placed in a cage by his captor, but showed a fierce temper, impatient of confinement, and soon fell a victim to his irritability. During a night and day, which his confinement lasted, his tapping labour was incessant, and after occupying his prison for that short space only, he left the wood-work pierced and worn like worm-eaten timber. His impatience at his situation was excessive, his efforts to escape were unremitted, and displayed much intelligence and cunning; he was fierce, and fearlessly familiar, and voracious of the food placed before him. At the close of the second day, he sunk under the combined effects of his vexation, assiduity, and voracity. His hammering, says a correspondent of the *Magazine of Natural History*, was peculiarly laborious, for he did not peck as other birds do, but grasping his hold with his immense feet, he turned upon them as upon a pivot, and struck with the whole weight of his body, thus assuming the appearance, with his entire form, of the head of a hammer, or, as I have sometimes seen birds on mechanical clocks, made to strike the hour by swinging on a wheel.†

STAMMERING.

According to Dr. Mac Cormach, stammering arises from an attempt to speak when the lungs are nearly empty, or when the stammerer is drawing in his breath. To cure this habit, he makes the stammerer take a deep inspiration, and repeat with the whole force of the expiration the different letters of the alphabet, numerals, and monosyllables, *one by one*. This may be prefaced or not by several hours' practice of deep and slow breathing. This practice is to be continued for hours, days, or weeks, according to the inveteracy of the habit; and then polysyllables are to be pronounced during one expiration; then short sentences, and ultimately long sentences. Thus, reversing the evil habit, a new habit is acquired, and the cure effected. In general, a few days, or at most weeks, will be sufficient.*

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* Edin. New Phil. Jour.

† Mag. Nat. Hist.

INFLUENCE OF TREES ON CLIMATE.

THE cutting down of forests, particularly on high grounds, has been remarked to diminish the quantity of rain, by diminishing, it is supposed, the attraction for clouds. The fact, however it may be explained, has been ascertained on a large scale in America. In Kentucky, for example, many brooks are pointed out which now fail in summer, a thing which was unknown twenty or thirty years ago. In New Jersey, where the woods have been more extensively cleared, some streams have been altogether dried up. On the contrary, many streams in the United States have rather increased since the clearing of the woods; because, though the quantity of rain may be possibly diminished, the compact bed of forest leaves formerly retained the water on the surface, and exposed it to rapid evaporation; whereas the tillage which has been introduced, allows the water to penetrate to some depth, and to afford a more permanent supply for springs and streams.†

PRESERVATION OF LEECHES.

A NEW vessel of deal, large enough to contain sufficient water for five hundred leeches, is to be furnished with a stop-cock to draw off the water. It is to be half filled with the mud from the lake or pond whence the leeches have been taken, and two or three roots of the Florence Iris (*Calamus Aromaticus*) are to be set in the mud. The leeches like this plant. The usual precautions as to temperature, frequent change of water, &c. are to be taken; the water is to be changed slowly, and the fresh water added by means of a funnel descending to the bottom of the vessel. This method has been found preferable to all others tried at the hospital of Bamberg.‡

HABITATIONS OF THE CADDICE, WATER MOTH.

THE caddices, in the larva state, live in the water, and, in order to protect themselves from being devoured by other aquatic animals, they select pieces of wood, leaves, stones, &c., which they cement together by a gluten with which they are provided, and thus form tubular habitations, the interior of which they line with a fine silk, spun by themselves. Some of these habitations are composed of minute stones, so arranged as to exceed the skill of any workman; the joints not only fit exceedingly close, but the internal part is completely smooth and circular, while all the angular parts of the stones are placed on the outside, and the cement used is so strong, that boiling water will not separate them. It frequently happens, that after they have formed their habitations, they find them too heavy to carry with them; in that case, they select a piece of wood, or any other light substance that will float, and which they attach, by means of their gluten, to the extreme end of their case, which renders it more buoyant in the water, and thus enables them to move from place to place with facility. When their habitations are too light, they then attach small stones, shells, &c. to them, in the above manner, which renders them heavier, and prevents the current of water from carrying them away.*

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* Med. Rep. † Mag. Nat. Hist. ‡ Bull. Univ.

MEDICINAL QUALITIES OF THE VIOLET.

The medicinal qualities of the violet order lie in the roots, which contain, in all the varieties, in a greater or less degree, emetic properties. One of the ipecacuanhas is the root of a Brazilian violet.†

CARRIER PIGEON.

Mr. Audubon, an American correspondent of the *Magazine of Natural History*, says he has shot the passenger pigeon of America (columba migratoria,) during his hunting excursions through the forests; and, on dissection, found its stomach full of fresh rice, which, to have resisted the digestive process, must have been swallowed not many hours preceding its death, but could not have been obtained within 800 miles of the place where it was killed.

INNOCUOUS NATURE OF PUTRID EXHALATIONS.

A committee have been engaged in France in examining the circumstances relative to the knacker's operations. His business consists in killing old worn-out horses, and turning every part of their body to account. The most singular results which the committee have obtained relate, to the innocuous nature of the exhalations arising from the putrefying matter; every body examined agreed that they were offensive and disgusting, but no one that they were unwholesome; on the contrary, they appeared to conduce to health. All the men, women, and children concerned in the works of this kind had unvarying health, and were remarkably well in appearance, and strong in body. The workmen commonly attained an old age, and were generally free from the usual infirmities which accompany it. Sixty, seventy, and even eighty were common ages. Persons who live close to the place, or go there daily, share these advantages with the workmen. During the time that an epidemic fever was in full force at two neighbouring places, not one of the workmen in the establishment at Montfaucon was affected by it. It did not appear that it was only the men who were habituated to the works that were thus favoured; for when, from press of business, new workmen were taken on, they did not suffer in health from the exhalations.

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* Gill's Tech. Rep.

† Mag. Nat. Hist.

In confirmation of the above observations, similar cases are quoted: above 200 exhumations are made yearly at Paris, about three or four months after death; not a single case of injury to the workmen has been observed. M. Labarraque has observed, that the catgut-makers, who live in a continually putrid atmosphere, arising from macerating intestines, enjoy remarkable health. Similar circumstances were remarked at the exhumations of the Cimitière des Innocens.

Whatever disease the horse may have died of, or been killed for, the workmen have no fear, adopt no precautions, and run no risk. Sometimes, when strangers are present, they pretend to be careful, but, upon close inquiry, laugh at such notions. They handle diseased as well as healthy parts *always with impunity.* They frequently cut themselves, but the wounds heal with the greatest facility, and their best remedy is to put a slice of the flesh about the wound.

On making inquiry of those to whom the horse-skins were sent, and who, besides, have to handle them when very putrescent, were more exposed to effects from diseases in the skin, they learnt that these men, also, from experience, had no fear, and never suffered injury. Horse-skins never occasioned injury to those who worked them, but in this they differed from the skins of oxen, cows, and especially sheep, which sometimes did occasion injury, though not so often as usually supposed.*

SINGING BIRDS OF THE OLD AND NEW WORLD.

It is a very unfounded notion, that in the New World the brilliant hues of the birds take the place o the power of song. On the contrary, it would appear from Wilson's *American Ornithology*, that the American song birds are infinitely more numerous than those of Europe, and many of them superior to our most celebrated songsters.†

COMMUNICATION OF DISEASE BY LEECHES.

In a journal entitled the "Westphaelischer Anzeiger," a case is recorded where some leeches, which had been employed first on a syphilitic patient and afterwards on an infant, communicated the disease to the latter. This warns us not to apply leeches to a second person without having sufficient assurance that the previous affection of the first patient was not infectious.*

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* Recueil Industriel. † Mag. Nat. Hist.

CAPACITY OF NEGROES.

PROFESSOR BLUMENBACH possesses a little library of works written by negroes, from which it appears, he says, that there is not a single department of taste or science in which some negro has not distinguished himself.†

ELEPHANT SKELETON.

MR. CROSS, the proprietor of the Exeter Change Establishment, has caused the bones of the enormous elephant, whom it was found necessary to destroy some time ago, in consequence of his exhibiting symptoms of madness, to be anatomically united; and the skeleton, in an erect position, now occupies the den in which the animal resided during his life. The articulations are perfect; not a bone is absent. The head, which appears to have been pierced by many bullets, is 13 feet from the ground; the top of the back is 12 feet. The bones weighed 876 lbs; the skin 17 cwt.; it is eight inches higher than the skeleton in the Museum in the Jardin des Plantes, at Paris.

PROGNOSTICS OF THE WEATHER.

RED clouds in the west, at sunset, especially when they have a tint of purple, portend fine weather. The reason of which is, that the air, when dry, refracts more red or heat making rays; and as dry air is not perfectly transparent, they are again reflected in the horizon. A copper or yellow sunset generally foretells rain; but as an indication of wet weather approaching, nothing is more certain than the halo around the moon, which is produced by the precipitated water; and the larger the circle the nearer the clouds, and consequently the more ready to fall. The old proverb is often correct:—

A rainbow in the morning is the shepherd's warning:
A rainbow at night is the shepherd's delight.

A rainbow can only occur when the clouds, containing or depositing the rain, are opposite to the sun; and in the evening the rainbow is in the east, and in the morning in the west; and as our heavy rains in this climate are usually brought by the westerly wind, a rainbow in the west indicates that the bad weather is on the road, by the wind, to us; whereas the rainbow in the east proves that the rain in these clouds is passing from us. When the swallows fly high, fine weather is to be expected or continued; but when they fly low and close to the ground, rain is almost surely approaching. This is explained as follows:—Swallows pursue the flies and gnats, and flies and gnats usually delight in warm strata of air; and as warm air is lighter, and usually moister, than cold air, when the warm strata of our air are high, there is less chance of moisture being thrown down from them by the mixture with cold air; but when the warm and moist air is close to the surface, it is almost certain that, as the cold air flows down into it, a deposition of water will take place.*

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* Med. Rep.

† Med Gaz.

SOURCE OF SALT IN WATER.

It has been supposed by some naturalists, that the salt in the sea has been gradually augmented by saline particles brought into it by rivers; but this cause is totally inadequate to explain the immense quantity of salt existing in the whole mass of the ocean. If the average depth of the sea be ten miles, and it contains two and a half per cent. of salt, were the water entirely evaporated, the thickness of the saline residue would exceed 1,000 feet.†

TRANSPLANTATION OF HAIR.

The Signor Dottore Domenico Nardo addressed a letter to the Academy of Padua, in 1826, on the subject of the growth of hair after death, and even after its separation from the body. The latter property had been previously observed by Krafft. The Signor Nardo recounts the results of experiments made on his own person, in the transplantation of hair, and relates, that by transplanting quickly a hair, with its root, from a pore of his head, into a pore of his chest, easily to be accomplished by widening the pore somewhat with the point of a needle, introducing the root with nicety, and exciting within the pore itself, by friction, a slight degree of inflammation, the hair takes root, continues to vegetate, and grows; in due season changes colour, becomes white, and falls.‡

FORMATION OF SOILS UPON A SMALL SCALE.

Sir Humphry Davy has explained in his *Agricultural Chemistry*, how this takes place on the surface of naked rocks by partial decomposition; the growth of lichens being succeeded by mosses, and, on their decay, by the smaller plants. A writer in the *Verulam* observes, "Even in cities this may be done by observing the successive steps by which the top of a brick wall, for example, becomes covered with vegetation. First, there is the green incrustation, called Byssus by Linnæus, but recently proved by our friend, Mr. Drummond, of the Cork botanic garden, to be the primary germination of several species of mosses. When this decays, a very thin stratum of vegetable earth is formed, which affords a scanty support for the roots of the next year's crop of mosses, and in process of time soil is formed of a sufficient depth for wall plants."

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* Sir H. Davy. † Bakewell's Introduction to Geology.

‡ Padua, Giornale di Letteratura Italiana.

BRUTE ANIMAL HAY MAKERS.

MARMOTS, in the strictest sense, make hay; they bite off the grass, turn it, and dry it in the sun. It is reported that they use an old she marmot as a cart. She lies on her back, the hay is heaped on her belly, and two others drag her home.*

THE GOLDEN-CRESTED WREN

MAY be taken, by striking the bough upon which it is sitting, sharply, with a stone or stick. The timid bird immediately drops to the ground, and generally dead. As their skins are tender, those who want them for stuffing will find this preferable to using the gun. White remarks, in his *Natural History of Selborne*, "that the golden-crested wren (the smallest British bird) will stand unconcerned till you come within three or four yards of it."†

DOMESTICATION OF ANIMALS.

IT appears that what we call the domestication of animals, consists in our becoming members of the society which these animals form among themselves. Man becomes the chief of its herd; from the moment that an animal admits man as a member of its society, it is domesticated,—"as a man could not enter into such society without becoming the chief of it." Applying these principles to wild animals, the apes and monkeys, notwithstanding their social instinct and intellect, are yet so violent and irritable, as to be incapable of all useful subjection. Among carnivorous animals, the seals, together with the various species of the dog tribe, would be the best adapted to attach themselves to us, and serve us. M. Cuvier suggests, that the seal might be trained for fishing, as the dog is for hunting. Several animals peculiar to South America, having but very feeble means of defence, will, as that country is peopled, gradually disappear from the face of the earth. After other illustrations, the writer concludes, that all domestication is founded on the propensity which animals have to live together in herds, and to attach themselves to one another. "We obtain it only by enticement, and principally by augmenting their wants, and satisfying them. But we could only produce domestic individuals, and not races, without the concurrence of one of the most general laws of life, the transmission of the organic or intellectual modifications by generation. Here one of the most astonishing phenomena of nature manifests itself to us, the transformation of a fortuitous modification into a desirable form; of a fugitive want into a fundamental propensity; of an incident habit into an instinct. This subject is assuredly worthy of exciting the attention of the most accurate observers, and of occupying the meditations of the most profound thinkers."*

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* Med. Gaz.

† Mag. Nat. Hist.

INFLUENCE OF LIGHT ON COLOURING THE LEAVES OF PLANTS.

It frequently happens in America that clouds and rain obscure the atmosphere for several days together, and that, during this time, buds of entire forests expand themselves into leaves. These leaves assume a pallid hue till the sun appears, when, within the short period of six hours of a clear sky and bright sunshine, their colour is changed to a beautiful green. A writer in Silliman's *Journal* mentions a forest on which the sun had not shone during twenty days. The leaves, during this period, had expanded to their full size, but were almost white. One forenoon the sun began to shine in full brightness. "The colour of the forest absolutely changed so fast that we could perceive its progress. By the middle of the afternoon the whole of these extensive forests, many miles in length presented their usual summer dress."†

ZOOLOGICAL SOCIETY.

(See the Plan.)

At page 139 of the *Arcana of Science* for 1828, we gave a synoptical account of this Society from its first establishment to the date of our publication.

The Second Anniversary was held April 29, when the report stated that upwards of 200 animals were on view, exclusive of wild fowl and gallinaceous birds which were preserved in the lake and islands in the Regent's Park, the use of which had been granted to the Society by the Commissioners of Woods and Forests. Among the new members were the Duke of Wellington and the Earl of Harrowby.

Towards the middle of the year the Society's *Gardens* in the Regent's Park were opened to the public, since which they have been crowded with visiters. The terms of admission are one shilling for each visiter; but it is requisite that each visiter or party should be provided with an order signed by one of the members of the Society. Such has been the influx of company, that in one week upwards of one hundred pounds have been received for admission.

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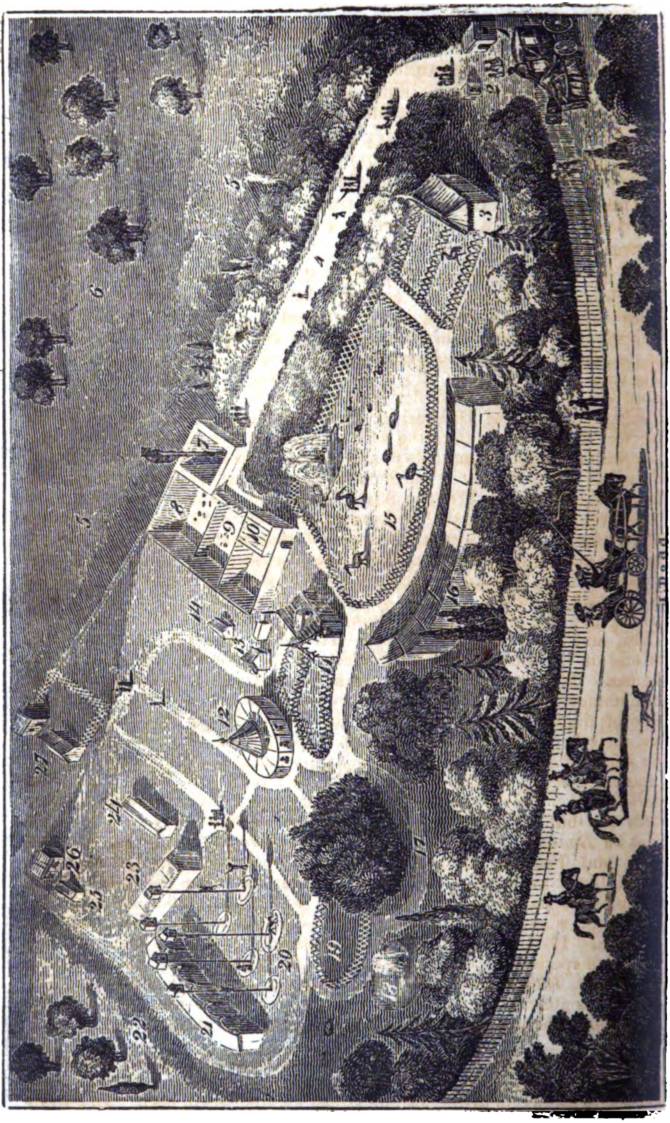
* Mem. du Museum d'Histoire Nat.

† Silliman's Jour.



THE ZOOLOGICAL GARDENS, IN THE REGENT'S PARK.

The Gardens, independent of their zoological attractions, are a delightful promenade, being laid out with great taste, and the parterres boasting a beautiful display of flowers. The animals, too, are seen to much greater advantage than when shut up in a menagerie, and have the luxury of fresh air, instead of unwholesome respiration in a room or caravan.

The annexed engraving represents a bird's-eye view of the Gardens, which will be better explained by reference to the figures, thus—

No. 1. Entrance Gate and Pay Hut. 2. Ditto, Check Hut. 3. House and Ground for *Emus:* two awkward land birds, resembling ostriches. Their incapability of flying is compensated by the exceeding great speed with which they run. They are natives of New Holland. The pair now at the Zoological Gardens were bred at Windsor, by Lord Mountcharles. The emu is hunted for its oil: it frequently weighs 100 lbs. and its taste, when cooked, more resembles beef than fowl. 4. Central Walk. 5. Sloping Shrubbery of Defence. 6. Fields for Horses and Cattle. 7. Building for *Bears*, communicating with their pit, in the centre of which is a pole with steps for the animals to ascend and descend. At the extremity of the upper walk, the pit is surrounded with a dwarf wall and coping, with iron rails. There are here two Arctic bears, and a small black bear, the latter brought from Russia,* and presented to the Society, by the Marquess of Hertford. There is usually a crowd of visiters about this spot, and the sagacity and antics of our four-footed friends ensure them liberal supplies of cakes and fruit, handed to them on a pole. 8 and 9. Ground enclosed for *Kangaroos*, of which there is a herd, large and small. 10. *Dens*, containing two fine *leopards*, a *porcupine*, racoons, a pair of fine *mastiffs* from Cuba, and two *Thibet Watch dogs.* 11. Gothic House for *Lamas.* This is one of the most picturesque objects in the grounds, and contains two Lamas. These animals are common in South America, particularly in the mountainous parts of Peru, where they are employed as beasts of burthen. One of the lamas was presented to the Society by the Duke of Bedford, and the other by Robert Barclay, Esq. of Bury Hill. 12. Circular Aviary for *Birds of Prey*, containing a *fine griffon vulture*, a white-headed *North American eagle*, *hawks*, *falcons*, and *owls;* among the latter is the *great horned owl.* This is supposed by Linnæus, and many antiquaries, to have been the bird of Minerva. This collection is remarkably splendid. 13. Hut for *Beavers.* 14. Hut and Ground for *Foreign Goats.* 15. Enclosed Area and Fountain for *Aquatic Birds*, as pelicans, Solan geese, China geese, black swans, &c. 16. Aviary. Here are three handsome crested cranes, four Indian spoonbills, together with three storks, three or four cockatoos, whose brilliant plumage outvies the gayest robe of art; and three curassos. 17. Grove and Huts for *Esquimaux Dogs*, of which there are three fine specimens. 18. Fountain, &c. for *water fowl.* 19. Enclosure for *zebras*, *Indian cows*, &c. 20. Houses on poles for *monkeys.* The monkey is attached by a chain to a ring placed loosely round the pole, by which means he ascends and descends at pleasure. 21. Aviary. 22. Twenty acres about to be added. 23. House for *monkeys*, &c. with double rows of cages, containing a fine South American ocelot, lynx, puma, cotamondi, an ichneumon, and several monkeys. 24. Aviary. 25. *Mexican hogs*, &c. 26. Huts for *Jackalls*, &c. 27. Unfinished houses, &c. There is likewise an enclosure for *tortoises*, of which there are three large, and several small ones. One of these tortoises is believed to be very old, and is of stupendous size. Among the birds, too, should be mentioned several beautiful varieties of pheasants, partridges, &c. which are well worth the attention of the visiter.

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* He was previously at Sudborne, the seat of the Marquess of Hertford, where Toby, as our Russian friend was christened, became equally sagacious with bipeds, in distinguishing strong ale from small beer. To the former beverage Toby became freely attached; but when we saw him at the Gardens in the Regent's Park, he appeared too docile for his companions.

We have probably passed over many animals, our object being merely to mention a few of the most interesting for their habits and peculiarities. Of course the collection is as yet incomplete, there being neither lion, tiger, hyæna, nor elephant: but when it is considered that the Society has been established little more than two years, in which time a Museum has been formed, and upwards of 1,100 subscribers obtained, besides the arrangement of the Gardens—it will be acknowledged that much has been done in a short time, and judging from the excellent organization of the Society and their past success, we anticipate the utmost realization of their plan.

Our readers need not be told that the Zoological Society is partly on the plan of the Museum of Natural History at Paris, except that the latter is supported by the Government, the Gardens are indiscriminately opened to the public, free of cost, and the Museum on stated days; and when we add that the names of Fagon, Duverney, Tournefort, Vaillant, De Jussieu, BUFFON, Daubenton, Fourcroy, Desfontaines, De Lamarck, and CUVIER, occur in its list of professors, they will not be surprised at the Musée d'Histoire Naturelle being the richest of its kind in the world.

As acceptable information, we subjoin the regulations for the admission of members and visiters to the *Gardens* in the Regent's Park, and the *Museum*, in Bruton Street.

Every member shall have personal admission to the Gardens and Museum, with two companions. If accompanied by more than two, he shall pay one shilling for each extra person.

A member, on payment of one guinea annually, may obtain an ivory ticket, which will admit one named person with a companion to both establishments; or a transferable ivory ticket which will admit one person. He may obtain two or more such tickets at the same rate.

Any member who may find it inconvenient to attend personally at the Gardens or Museum, may, upon application to the council, have his privileges transferred, within the present year, to any individual of his family, whom he may name.

Every member will be expected to give his name on entering the Gardens and Museum.

The Gardens will be open from eight o'clock, A. M.; but they will be in complete readiness for the reception of visiters only from ten o'clock to sunset. The Museum will be open from ten o'clock to six.

Several important additions have likewise been made to the

Museum in Bruton Street, which are too numerous for detail. The preceding account of the Gardens is abridged from No. 330, of *The Mirror*.

ZOOLOGICAL SOCIETY.

The *Museum* now contains 600 species of mammalia, 4,000 birds, 1,000 reptiles and fishes, 1,000 testacea and crustacea, and 30,000 insects. During the last seven months, the *Gardens* and Museum have been visited by upwards of 30,000 persons. The Vivarium contains upwards of 430 living quadrupeds and birds. The expenses of the past year have been 10,000*l.*, partly contributed by the admission of the public, and still more largely by the members of the Society, who already exceed 1,200 in number.

SUPPOSED NERVOUS SYSTEM IN PLANTS.

M. Dutrochet, in a volume on the moving powers which act in organized bodies, affirms, that there are seen on the walls of the cellular and fibrous tissue of vegetables, small semi-transparent globular bodies and linear bodies, which become opaque from the action of acids, and are rendered transparent by that of alkalies. He considers these small bodies as the elements of a diffused nervous system, to the action of which he ascribes the movements of plants, arising from what is denominated by him the *nervomotility*.*

RICE.

Trials have recently been made to grow the dry rice of China in Italy; and it is expected that in time an advantageous cultivation of it may be introduced in France.†

PREPARATION OF CINNAMON.

The rough bark is first scraped off with knives, and then, with a peculiar instrument, the inner rind is stripped off in long slips; these are tied up in bundles, and put to dry in the sun, and the wood is sold for fuel. The operation was thus explained to bishop Heber by the cinnamon peelers; in the regular preparation, the outer bark is not scraped off; but the process of fermentation, which the strips undergo when tied up in large quantities, removes the coarse parts. The peelers are called Chaliers.‡

COFFEE.

It was owing in some measure to a distinguished French botanist, that we are so abundantly furnished with the coffee berry. Two plants were, under his care, taken to the West Indies, from the botanic gardens at Paris, but on the voyage the supply of water became nearly exhausted; this person was so anxious to preserve the plants that he deprived himself of his allowance in order to water the coffee-plants. From these two, all the coffee grown in the West Indies has sprung. Formerly, coffee could only be got at a great expense from Mocha in Arabia.*

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* From the French. † Mirror. ‡ Ibid.

ALLIGATORS SWALLOWING STONES.

The Indians on the banks of the Oronoko assert, that previously to an alligator going in search of prey, it always swallows a large stone, that it may acquire additional weight to aid it in diving and dragging its victims under water. A traveller being somewhat incredulous on this point, Bolivar, to convince him, shot several with his rifle, and in all of them were found stones varying in weight according to the size of the animal. The largest killed was about 17 feet in length, and had within him a stone weighing about 60 or 70 pounds.

JONAH'S "WHALE."

On March 22, the Rev. Dr. Scot, of Corstorphine, read before the Wernerian Society, a paper on the great fish that swallowed up Jonah, showing that it could not be a *whale*, as often supposed, but was probably a white shark.

BROOKS'S MUSEUM.

The sale of Mr. Brooks's celebrated Museum, containing upwards of 6,000 preparations, lately took place at his theatre of anatomy, Blenheim-street. This collection occupied the proprietor thirty years in making. It comprised models and casts, accurately painted from nature, of nearly every case of natural and preternatural parturient presentation that has occurred, with a multitude of casts of fœtal monstrosities of every species, almost ad infinitum, either actually modelled or moulded from recent unfortunate individuals, chiefly under Mr. Brooks's eye. Some of the specimens connected with surgery, were taken from morbid limbs which had been subjected to amputation on account of incurable maladies. The first and second day's sale consisted of models and casts of the gravid uterus, fœtal monstrosities, a multitude of fac-similes of pathological subjects, a series of accurate dissections of the human brain, &c.—The third day's sale was the anatomy and pathology of the horse, zebra, quagga, ass, and kangaroo.—The fourth was the anatomy and pathology of the human bladder, kidneys, and contiguous viscera, &c.—Fifth, order Pteroenta, Colugo, and Bats: order

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* The Mirror.

Insectivora, Exincisiora, Marsuepialia, Prædacea.—Sixth, lion, tiger, dog, bear, whale, seal, morse, &c.—Seventh. Wet preparations, consisting of the anatomy and pathology of the male organs of generation, the larynx, pharynx, tongue, lungs, &c.—Eighth. Zoology. Apes, baboons, monkeys, beavers, rats, &c. Ninth. Anatomical and pathological preparations in spirits.—Tenth.—Zoology. The order Ruminantia.—Eleventh. Anatomy. —Twelfth. Zoology. The elephant, hippopotamus, rhinoceros, goat, sheep, &c. On the 8th of August, being the 20th day, the sale was postponed till farther notice, owing to the length of time it was expected to occupy. At least a third part of the choicest specimens remain unsold.

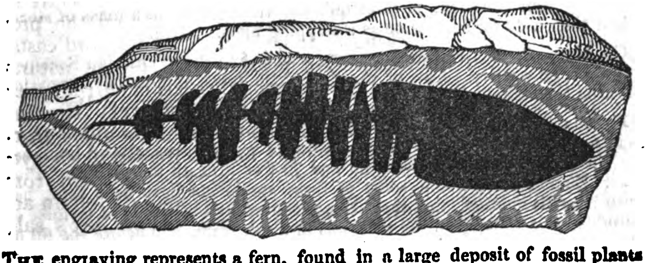
GAZELLES.

The menagerie of the Museum of Natural History at Paris, has received the addition of two beautiful gazelles from Senegal. One is a male kevel, still young, but which already shows all the characteristics of its species; horns with double curves, fine fallow hair, black tail and black line on its flanks, and two white spots on the sides of its nose. The other is a female guib, which therefore has no horns, and the fallow hair of which is agreeably varied by cross lines and white spots.*

FOSSIL ORGANIC REMAINS.

As in our preceding volume, under the above head, we have assembled the most interesting discoveries of the past year, in this very popular department of scientific enquiry.

British.



The engraving represents a fern, found in a large deposit of fossil plants in Grysthorp Bay, near Scarborough.† The fern displays a most curious and singular diversity of form in the same leaf. In the genera of Acrostichum and Varoclea, the fertile fronds contract around the fructifications, and give to one leaf a very different form from another; and the same thing is seen in the Blechnum spicant, which indeed bears much resemblance to our coal plant in general habit, but which varies in this biform leaf, tongued at the extremity, and pinnated towards the base.—*Jameson's Journal.* So beautiful are these plants that Dr. Murray says, "they resemble so many fine drawings in Indian ink, on the shadows of delicate foliage by moonlight cast upon a smooth and white ground or wall."

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* New Monthly Mag.

† See Arcana of Science and Art for 1828.

Brighton. The rib of a whale has lately been discovered in diluvium, near Kemp Town. After several hours labour an excavation was made in the cliff to the extent of nearly four yards, and the stone and sand which surrounded the bone were carefully cleared away; but in attempting to remove the specimen, the whole mass fell to pieces. The length of the bone was about 12 feet, being upwards of 30 inches in circumference at the largest extremity; when perfect, it must have exceeded 20 feet in length. From the structure, form, and size of the bone, there can be no doubt that it was a portion of a rib of some species of whale; and we believe it is the only instance of this animal having been found in the diluvial deposits of England.—*Jameson's Journal.*

At Clach-benine quarry in Forfarshire, on the left bank of the Tay, some organic specimens have lately been discovered. They resemble the scales of a fish, vary considerably in size, from being an inch to two inches in length, from half to an inch and a half in breadth, and from a tenth to an eighth of an inch nearly in thickness. No entire skeleton has yet been found, although there is one specimen which bears a very strong resemblance to the shoulder of a fish, and another of very small dimensions, can, with a little help from the imagination, be made out as an impression of the whole animal. What particularly enhances the value of this discovery is, that the rock in which it has been made, is the *old red sandstone*, which belongs to that series and geological epoch in which so few organic remains have hitherto been found, and from which we date the existence of the vertebral animals.—*Brewster's Journal.*

Turtle. The remains of a sea turtle have lately been discovered, and are now in the possession of Mr. Deck, of Cambridge. It is imbedded in a mass of septaria, weighing upwards of 150 pounds, with two fine specimens of fossil wood; and was obtained in digging for cement stone, about five miles from Harwich, in three fathoms water, where, as a mass of stone, it had been used for some time as a stepping block.—*Ibid.*

On March 8, Mr. Robert Stevenson read before the Wernerian Society a notice on the wasting effects of the sea, which have exposed a submarine forest on the shores of Cheshire, between the rivers Mersey and Dee.

Footmarks in Sandstone. Numerous impressions of the footsteps of quadrupeds have been discovered on a bed of red sandstone, near Lochmaben, in Dumfriesshire, between 60 and 70 feet beneath the surface. Professor Buckland, to whom some of these specimens have been sent, has given it as his opinion, that they were produced by the feet of a tortoise or crocodile, at a time when the rock was in a soft state, and before the 60 or 70 feet of solid strata with which it is now covered, had been superimposed. —*Jameson's Journal.*

Foreign.

Baron Cuvier has presented to the French Academy of Sciences, a portion of the fossil jaw bone of a carnivorous animal lately discovered in the gypsum quarries of Montmartre, which can only be compared with the *Didelphis* Cynocephala of Van Dieman's Land.

Human Remains. The remarkable fact, that no vestiges of human remains have been discovered with those of the more ancient inhabitants of the globe, is at present fully confirmed; nor have any fossil bones of monkeys hitherto been found. Mr. Bakewell, however, observes, that the vast diluvial beds of gravel and clay, and the upper strata in Asia, have not yet been scientifically explored, and both sacred and profane writers agree in regarding the temperate regions of that continent as the cradle of the human race.—See *Bakewell's Geology*, 3rd edition, 1828.

The Annals of the Lyceum of Natural History of New York, (November, 1827) describe the discovery of a fossil walrus, or sea horse in Virginia; the fossil skull of an extinct species of ox, from the banks of the Mississippi, and of other fossil bones in Georgia, United States. In a communication from Dr. Jeeger, of Stutgard, to Mr. Mantell, of Lewes, the learned Professor states that he has discovered in the *Kenper-sandstein* the remains of two species, if not genera, of herbivorous reptiles: the one having lateral teeth of a cylindrical, and the other of a cubical, form; the latter somewhat resembling the teeth of the *Igwanadon.—Philos. Mag.*

Mr. Crawfurd has presented to the Museum of the Geological Society, the fossil remains of two new species of mastodon, and of other vertebrated animals found on the left bank of the Irawadi; during the late mission to Ava. Mr. C. has likewise collected many vegetable and animal remains, and rocks from the country of the Burmese.—*Trans. Geolog. Soc.*

Some gigantic bones have been exhibited at New Orleans, but the place where they were found is not mentioned in the communication. They consist of one of the bones of the cranium, 15 or 20 vertebræ, two entire ribs, and part of a third, one thigh bone, two bones of the leg, &c. The cranial bone was upwards of 20 feet in its greatest length, about 4 in extreme width, and it weighed 1,200 lbs. The ribs measured 9 feet along the curve, and about 3 inches in thickness. It had been conjectured that the animal to which these bones belonged was amphibious, and perhaps of the crocodile family. It was also supposed that the animal when alive, must have measured 25 feet round the body, and about 130 feet in length. —*Ibid.*

Cave of Miremont. Fossil bones, in general resembling those which have been found in the caves of Germany and England, and latterly in those of France have lately been discovered in the Cave of Miremont, in the department of the Dordogne. The remains of pottery, &c., found in the same cave, are referred to the times preceding the introduction of Roman arts among the Gauls.

In a cavern in the commune of Lunel Viel, recently explored, there have been found the bones of twenty-one recognized species, imbedded in a fresh-water alluvium, including two varieties of the hyena, the lion, bear, rhinoceros, horse, deer, ox, shark, and sea-tortoise.

A workman at New Haven, in the United States of America, lately broke a mass of very firm conglomerate rock, and found lodged in a cavity, so completely as to exclude the possibility of external introduction, a piece of wood, the small limb of a tree, apparently of the pine family, with the bark entire; the wood not mineralized, but fresh, and in perfect preservation, and not even attached to the walls of the cavity, except slightly at one end, but lying in it, as in a case. The piece of wood was not longer than a finger, and the cavity but 2 or 3 inches in diameter. The conclusion from this interesting fact appears irresistible, that this piece of wood was floating in the waters which were charged with the materials of the rock, and became enclosed during their consolidation; thus proving that this rock had never been ignited, and that a tree or shrub was in existence when it was formed. The rock has been usually referred, by American geologists, to the red sandstone formation.—*Silliman's Journal.*

ASTRONOMICAL AND METEOROLOGICAL.

WATERSPOUT AT EDINBURGH.

On May 14th.—At half-past ten o'clock in the morning the unusual phenomenon of an aerial waterspout was observed in the neighbourhood of Edinburgh. A light dusky cloud of a funnel shape was seen in a north-westerly direction, clearly relieved from a darker cloud behind. It was evidently transfusing the contents of a very dense and dark black cloud into one immediately below, with which it formed the only connexion. At this time the lower extremity of the waterspout was bent from the direction of the wind, being N.E.; the upper cloud was moving in a *contrary* direction. In a very few minutes it reached its greatest distinctness, and a manifest transfusion of the contents was taking place, the column presenting the appearance of smoke or steam, and the undulation at the edges was scarcely perceptible. The form it assumed at this period is shown in the Engraving *Figs.* 1, 2, according to a sketch made shortly after, the lower extremity being turned towards the west. The undulations at the edges gradually increasing in distinctness, the waterspout grew less elongated, and the bottom turned in a direction contrary to the wind, which below still remained in the same point. The cloud above had now become less dense, while the one below increased in blackness, and that quarter of the sky became more generally dark; it then became short, with a broad conical ter-

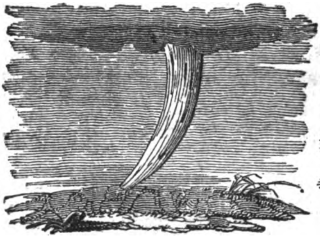

Fig 1.

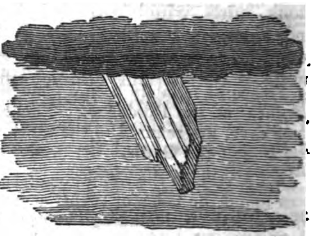

Fig. 2.

mination, nearly as represented at Fig. 2. During this change the currents descending on the east and ascending on the west side presented at the bottom the appearance of violent ebullition. The waterspout then merged into the cloud above, and in about twenty minutes after being first observed it wholly disappeared.

The weather had been dry and sultry (temp. 61°.3) and the air appeared highly electrified. The change which followed was very remarkable. Partial torrents of rain fell in the direction in which the phenomenon was observed; and it was remarked in the vicinity of the place where the spout was noticed, that such a fall of rain had seldom been seen, although *there* only a few drops fell. The shower appears to have moved from the N.W. A very curious effect was observed upon the dusty roads, which were *extremely partially soaked* in that direction.*

RAIN GAUGE.

THE following is a simple mode of constructing this valuable instrument:—Take a funnel, whose opening is exactly 10 square inches, and fix it in a bottle; as the rain descends, it will fall into the funnel, and from thence into the collecting vessel. The quantity of rain caught is ascertained by multiplying the weight in ounces by ·173, which gives the depth in inches and parts of an inch.†

WATERSPOUTS IN THE INDIAN OCEAN.

ACCORDING to Mr. Main, the waterspouts in the Straits of Malacca and Singapore arise from the convergency of the air and the clouds to the spaces left unoccupied by the heavy and impetuous rains which precede them. "These generated various and contrary currents of air, wheeling the clouds in violent commotion; partial tornadoes were consequently created; these by their vertiginous course, affected the adjacent and surrounding vapours, drawing them into the vortices. The grosser parts of this whirling body of vapour naturally inclined to the centre of the tornado, and these coalescing, formed the aqueous column called a *waterspout*.

"The first appearance of this phenomenon is the lower end of the column impending from the base of a dark cloud, in the shape of an inverted cone, in a somewhat waved direction, descending gradually to the sea or earth. When it happens to descend on the former, a considerable body of air around the spout partakes of its motion, because the water is violently agitated therewith for a considerable time before the point of the cone reaches the surface; and during its approach, a cylindrical body of thick spray, greater in diameter than the spout, is seen raised from the waves, and appears to meet it in its descent, and when in collision the agitation is extreme. The contact continues for ten or twenty minutes, according to the size of the spout, and when exhausted, the lower end becomes broken, less depressed, and shrinking as it were upwards, disappears as it begun."

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* Philos. Mag.

† London Journ. Arts.

On one occasion Mr. Main saw *five* waterspouts from the ship at the same instant, some of which were above the land and others above the sea, the nearest being about five miles distant. One of these, illuminated by the sun's rays, and viewed through a small telescope, gave distinct indication of being tubular.*

TEMPERATURE OF THE PLANETARY SPACE.

According to Mr. Fourier, the temperature of the space occupied by our planetary system, is nearly 90° of Fahrenheit's scale colder than the temperature of freezing ice.

EXTRAORDINARY EFFECT OF HEAT.

During Captain Franklin's recent voyage, the winter was so severe, near the Coppermine River, that the fish froze as they were taken out of the nets; in a short time they became a solid mass of ice, and were easily split open by a blow from a hatchet. If, in the completely frozen state, they were thawed before the fire, they revived. This is a very remarkable instance of how completely animation can be suspended in cold-blooded animals.†

HASTINGS.

The coldest month experienced at Hastings in 1828, was Feb., which notwithstanding, gives a mean temperature of about 44°; a striking example of the mildness of the late winter. A register of the same month in the year 1826, taken at Hastings, gives as the mean 43°. 5; but even this is perhaps rather higher than the coldest month generally Baron Humboldt makes the mean of the coldest month in Edinburgh 38°. 3; Paris 35°. 1; and Rome 42°. 1. If, therefore, either of the former could be considered as a fair average, our winter mean temperature on the southern coast would prove higher than even that of Rome.‡

ACCOUNT OF TWO REMARKABLE RAINBOWS.

By D. Brewster, F.R.S.

On the 5th July, 1828, there was seen at Edinburgh the most brilliant rainbow that I had ever an opportunity of witnessing. Both the outer and the inner bow were perfectly complete, and equally luminous in all their parts; and they continued in this condition for a very considerable time. I was thus enabled to

* Philos. Mag. † The Mirror. ‡ Brande's Jour.

verify in every part of the two bows, the fact which I published more than fifteen years ago, of the polarization of the coloured light, in planes passing through the centre of the bow, or, what is the same thing, in the planes of reflection, within the drops of rain. Similar portions of the inner and the outer bow were thus seen to disappear simultaneously, when seen through a plate of tourmaline.

The peculiarity in this rainbow, which has induced me to describe it at present, has, I believe, never before been noticed. On the outside of the outer or secondary bow, there was seen distinctly a red arch, and beyond it a very faint green one, constituting a supernumerary rainbow, analogous to those which sometimes accompany the inner bow. It will be interesting to ascertain, if Dr. Young's ingenious theory of the common supernumerary bow will apply to the present one.

In the afternoon of Thursday, the 2nd of October, a rainbow appeared in the north-east, with considerable brilliancy, and was accompanied with the rare phenomenon of the converging of the solar beams. As the point to which the solar beams converged below the horizon was exactly opposite to the sun, and, therefore, necessarily coincident with the centre of the rainbow, the two phenomena, when thus accidentally combined, had a very remarkable appearance.

ANCIENT METEOROLOGY.

In some diaries which are extant of the 14th and 15th centuries, we find the state of the weather, on the first twelve days after Christmas, and on these days alone, noted with great exactness. This practice had its origin in a foolish notion, that the meteorological character of each of the twelve months of the year was prefigured by that of each of the twelve days after the anniversary of the birth of our Saviour.

ENCKE'S COMET.

The comet, denominated Encke's comet, which is now engrossing the public mind generally, and the scientific world in particular, has justly claimed and received the careful attention of astronomers, since its appearance in 1818 engaged Professor Encke to consider the elements of its orbit. He was enabled to identify it with a comet described by Messrs. Mechain and Messier in 1786, in the constellation Aquarius; also with a comet discovered in 1795 by Miss Herschel in the constellation Cygnus: and with the comet in 1805. The investigation of the diligent professor enabled him to foretell its re-appearance in 1822, and to state the probability of its not being observable in our climate. This anticipation was realized by the fortunate circumstance of the attachment of Sir Thomas Brisbane to astronomical pursuits, who was then governor of New South Wales, and had fitted up an observatory there, and provided himself with the able assistance of Mr. Rumker. The latter gentleman appears to have discovered the phenomenon on June 2, 1822; and his accurate observations afforded Encke the means of reconsidering the true elements of the comet's orbit, and with additional confidence to compute its return for 1825. This occurred as was expected; the fresh data afforded by that return were carefully collated by the professor to enable him still more satisfactorily to define the orbit, and with increased confidence to predict its return this year. It was first observed by Mr. South, on October 30, 1828. This comet affords particular interest to the mind of the astronomer, though it does not offer a splendid object to his eye. Its orbit is an ellipsis of comparatively small dimensions, wholly within the orbit of Jupiter; its period is about three years and three-tenths,—a much shorter period than has hitherto appeared due to any other comet, with the exception of one seen in 1770, which did not satisfy, as far as observation has been able to show, the prediction of the period of five years and a half which was attributed to it. In the opinion of Encke and other astronomers, the comet which is now visible may afford an opportunity of proving that the heavens oppose a resisting medium to the motion of bodies. This subject has been discussed in the Transactions of the Astronomical Society of London, by the able mathematician Masetti; and that gentleman offers strong reasons for considering comets capable of affording a demonstration of a resisting medium in the heavens, though planets may give no indication of it. Another comet which encourages the anticipation of much astronomical gratification, is one which Biela discovered February 27, 1826, and which was afterwards seen by Gambart and others. It seems to possess similar claims to the attention of astronomers as that of Encke, it being conceived to revolve about the sun in about six years seven-tenths, and to be the same as the comet which appeared in 1772 and that which appeared in 1806. Encke's comet will be in its perihelion, by computation, on 10th January, 1829.*

COMET OF 1811.

According to the recent calculations of the Professor Lamberti, of the University of Dorpat, the comet so long visible in the year 1811 was 57 2-3 times smaller than the sun, but 17 times bigger than Jupiter, 25,104 times bigger than our globe, 1,255,000 times bigger than the moon, while its orbit exceeds that of all the planets of our solar system put together.†

METEORIC STONE

Which fell in India on the 27th February, 1827.—This aerolite fell in the district of Azim Gerh, nearly five miles from a village called Mhow. It fell about three o'clock, in a perfectly clear and serene sky, and was accompanied with noises like the roaring of cannons. Four or five fragments were picked up four or five miles asunder; one broke a tree and another wounded a man severely in the arm. The largest piece weighed 3 pounds. It is perfectly similar to that which fell near Allahabad in 1802, and near Mooradabad in 1808. The specific gravity was 3.5. The presence of chrome and nickel was ascertained.*

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* Companion to the Almanac.

† Leipzeiger Literatur Zeitung.

METHOD OF FINDING THE COURSE OF THE AIR WHEN THE WIND IS STILL.

PLACE a basin of water in a free exposure, throw a red hot cinder into it, and observe how the smoke which it produces inclines. Sailors throw a piece of live coal into the sea for the same purpose; and also wet a finger, hold it up in the air, and then by feeling which part becomes (by evaporation) cool, they judge of the direction of the current of air. An instrument on the last principle has been invented by Mr. B. M. Forster.†

THE WINDS.

IT may be stated as a rule without exception, that the west winds are more frequent than the east. But the west winds diminish more and more in proportion as the centre of the continent is approached: they are more frequent in England, Holland, and France, than in Denmark, and in the greatest part of Germany: they are of more frequent occurrence in the last mentioned countries than in Sweden and Russia. In London, the east winds (N.E., E., S.E.) are to the west winds (N.W., W., S.W.) as 1 is to 1.7; at Amsterdam, as 1 to 1.6; at Sœndmoer as 1 to 1.6; at Copenhagen as 1 to 1.5; at Stockholm as 1 to 1.4; at Saint Petersburg as 1 to 1.3.

The west winds blow from the direction of the south point in proportion as the Atlantic sea is approached: towards the middle of the continent they blow more nearly from the direct west quarter, or from N.W. The north winds appear to increase as we go eastward. Among the winds which blow from the west, that of the S.W. quarter is most prevalent in England, Holland, and France: the direct west predominates in Denmark, and in the greater part of Germany; at Moscow the N.W. is most prevalent; at St. Petersburg and Stockholm, the north wind is much more frequent than in the more western parts of Europe.

In the western and central parts of the north of Europe, such as England France, Denmark, Germany, Norway, the west winds are much more frequent during the summer than during the winter and spring. This does not appear to be the case in

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* Brewster's Jour.

† Mech. Mag. See also p. 58 of this volume.

Sweden or Russia. During winter, the point from which the western winds blow inclines to the south; they are more direct and more northern in the summer. This rule, however, does not appear to extend to the eastern parts of Europe.*

CLIMATE OF MALTA.

Malta is perhaps as free as any situation in the Mediterranean from terrestrial sources of unhealthiness; and Valetta enjoys a happy immunity from the injurious effects resulting from changes of wind, being situated on the north side, and having its Sirocco winds ameliorated by their first traversing the surface of the island. In winter the northerly winds are always rendered more temperate, by their previous passage over the intervening sea, after they leave the cold surface of Europe; while along the southward of Greece, those winds are then felt in all their original frigidity. The opposite results obtain in the latter part of summer; the northerly winds are cool at Malta, and hot and dry on the south shores of Greece. In March, a fall of hail stones has been seen on the island, about an inch in depth; and at this time of the year, the winds often, from their great and frequent changes, lose their distinctive characters; thus, the south-east, or Sirocco, has been found cloudy, cold and wet; and the westerly and south-westerly winds neither mild nor warm,—all these anomalies arising from the frequent changes, tossing backwards and forwards the same mass of atmosphere and clouds.†

METEOR OF A GREEN COLOUR.

On the night of the 11th of February, 1828, between eleven and twelve o'clock, as I was crossing the East River, between New York and Long Island, I observed a beautiful meteor, which was visible for about the space of two seconds. Its course was from a point perhaps 5° below zenith, toward the horizon in a N.E. direction. It described an arc of perhaps 20°, when it apparently exploded without any report that I could hear. Its colour was a singularly pure *grass green*, of a light shade; the tail which it left was of the same colour, and so were the scintillations which accompanied its apparent explosion. The latter were distinct, like those accompanying the bursting of a rocket, but by no means so numerous. Two gentlemen who were in the boat with me at the time also saw it.‡

MEDALS OF THE ASTRONOMICAL SOCIETY.

Two medals were awarded by the Council of this Society, at their anniversary, February 8th, 1828:—One to Sir Thomas

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[*] Bull. Univ. [†] Jameson's Jour. [‡] Silliman's Jour.

Macdougal Brisbane "for the inestimable benefit conferred by him on astronomical science, in the establishment of his observatory at Paramatta in New South Wales, and for the valuable and important series of observations made there by himself, and under his directions, during his residence as governor of that colony":—the other to Mr. James Dunlop, "for his disinterested and indefatigable pursuit of astronomical researches, subsequent to the departure of Sir T. M. Brisbane from the colony of New South Wales, whereby he has added, in a most material degree, to our knowledge of the nebulæ of the southern hemisphere."

At the same time it was resolved unanimously, "That a Gold Medal of this Society be given to Miss Caroline Herschel, for her recent reduction, to January 1800, of the Nebulæ discovered by her illustrious brother, which may be considered as the completion of a series of exertions probably unparalleled either in magnitude or importance, in the annals of astronomical labour."

SHOWER OF ICE IN STAFFORDSHIRE.

On Saturday the 9th of August, 1828, there was a fall of solid ice at Horsley in Staffordshire. Some of the pieces were three inches long by one inch broad, and others were about three inches in circumference, and quite solid. One gentleman in Dudley had 70*l.* worth of glass broken in his own house, and at Mr. York's house near the Horsley Iron Works, about 150 panes of glass were broken. About 100 panes were broken at the iron works. The storm was accompanied with very heavy thunder, but no lightning. The crops upon which the ice fell are said to be completely ruined.*

BLOWING A RIVER OUT.

The southern mail is stated to have failed at Washington, in consequence of the gale, which was so long and so violent, as to blow the waters out of the Potomac to such a degree as to render it unnavigable.†

VIBRATION OF GLASS VESSELS INDICATIVE OF APPROACHING STORMS.

Professor Scott, of Sandhurst College, observed in Shetland, that drinking glasses placed in an inverted position upon a shelf in a cupboard, on the ground floor of Belmont house, occasionally emitted sounds as if they were tapped with a knife, or raised up a little and then let fall on the shelf. These sounds preceded wind, and when they occurred, boats and vessels were immediately secured. The strength of the sound is said to be proportional to the tempest that follows.‡

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* Brewster's Jour. † New York Paper. ‡ Ann. de Chim.

COMPOSITION OF HAIL STONES.

On analyzing small stones enclosed in hail which fell in the circle of Sterlitamak, in the government of Orenburg, in 1825, they were found to contain in a hundred parts, of red oxide of iron 70.00, of oxide of manganese 7.50, magnesia 6.25, alum 3.75, flint 7.50, sulphur and waste 5.00.*

SOLAR SPOTS, &c.

On the 27th of May, 32 maculæ or black spots, in groups were observed on the sun's disc; the largest with its umbra exceeded by admeasurement the circular extent of the earth, and was situated near the central part of the arc which formed the lower right-hand quadrant. The nucleus of this spot, or the opening in the sun's atmosphere (a rational hypothesis of the late Dr. Herschel,) was in the shape of a man's hat, and the well-defined speckled umbra nearly so, with the exception of the angular parts. Seven of the largest spots were in a line near the sun's centre, and four near the upper limb; most of the others were interspersed about the largest, which went off the visible part of the disc by means of the sun's motion on its axis in the night of the 29th.

The apparent angular distance of the planet Venus from the sun's centre at the time of its greatest eastern elongation on the 19th, was 45° 28' 30", when its appearance was like the moon at her last quarter with an inverting telescope, or at her first quarter without an inversion. This planet, which is the most radiant in the solar system, and which then cast a faint shadow in the evening after twilight, was seen with the naked eye in the open day in clear weather during the four following weeks.

The large solar spot came round on the sun's eastern limb in the night of the 12th June, and was well defined by the 14th, when the nucleus had assumed the shape of a pear; on the 17th it was bell-shaped, and on the 19th, when nearest to the sun's centre, the umbra and nucleus were nearly circular, with a few indentations on the edge of the latter, and but little apparent diminution in the size of either since the 27th of May. At 7 A.M. on the 23rd it was, as nearly as could be ascertained from a drawing, in the same position on the sun's disc as on the 27th; and on the 26th at sunset it was very near his lower limb in a very contracted state, resembling a line without any perceptible umbra, and went off on his posterior side again in the night, making a complete revolution in both cases in twenty-seven days, and thus travelling, when the necessary correction is made for the earth's annual motion in the ecliptic during the period of its revolution, at the rate of 1,454 miles per hour, which is the velocity of a point on the earth's equator as 7 to 5 nearly. Early in the morning of the 19th, this spot was within 9° of the sun's equator, or its declination was 9 degrees North. Its largest diameter, from a mean of several admeasurements, was 1½ diameter of the earth, or about 12,000 miles. It appears from a drawing of the positions of this spot, and another large one that accompanied it, whose declination was about 19° S., that in their daily progress across the sun's disc they moved in slightly parallel curved lines from east to west, and went off nearly at the same time. Subsequent to the 27th of May, considerable variations and alterations took place in the positions and number of the solar spots; some entirely disappeared, while new ones appeared on other parts of the sun's disc.*

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* Bull. Univ.

EXTRAORDINARY INSTANCES OF FALL OF RAIN.

May 20, 1827, six inches of rain fell at Geneva, in the short space of three hours.

From September 23 to 27, there fell at Montpellier, fifteen inches eight lines of rain. In forty-eight hours, from the 24th to the 26th of that month, eleven inches ten lines of rain fell at M. Berard's manufactory, near Montpellier.

The fall of rain at Joyeuse (department de l'Ardêche) was, according to the registers of M. Tardy de la Brossy, most extraordinary. The maximum of rain collected in any one day, for twenty-three years, was on the 9th of August, 1807, as much as nine inches three lines. But on the 9th of October, 1827, there fell *twenty-nine inches three lines of rain*, in the space of twenty-two hours. Eleven days of that month, according to the same registers, gave thirty-six inches of water, or about double the quantity which fell at Paris during the whole year.

During the dreadful fall of rain on the 9th, the barometer was nearly stationary, and only two or three lines beneath its mean height. Claps of thunder succeeded each other without intermission.†

FALL OF AEROLITES.

On the 26th Sept. (Oct. 8th) 1827, a shower of aërolites fell near Belostok, between nine and ten o'clock in the morning. The inhabitants were alarmed by an extraordinary noise which proceeded from a large black cloud that hung over their heads, and which continued for three (some say six) minutes, resembling a running fire of musketry. The noise, which was heard by several persons at the distance of more than fourteen wersts, was succeeded immediately by a shower of stones, of which only four were picked up; the largest weighed four pounds, the smallest three quarters.‡

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* Philosoph. Mag.

† Ann. de Chimie.

‡ St. Petersburgh Gazette.

WATER SPOUT.

At 52′ after 6 o'clock on the 11th of August last, a portion of a dark cloud, suspended below the summit of the Savoy mountains, suddenly took a vertical direction, and, being gilded with the deep orange tint of the setting sun, attracted universal attention, and enabled the spectators to trace all its movements. Its form was that of an inverted cone, the summit of which was about 200 feet above the surface of the lake, to which it precipitated itself in less than two minutes. This elongation of the cone took place by an oscillatory motion. This part of the spout appeared cylindrical, and its diameter was about 10 or 12 feet. The moment it reached the lake, a great mass of the water was briskly agitated, as if it had been boiling, the foam rising to a height of more than 50 feet. This large column of water was inflected like a riband exposed to the wind. In eight minutes it reached the mouth of the Rhone, and as long as it was above the river the boiling continued and the column was unbroken. When it quitted the river, the boiling ceased and the whole soon disappeared, the base of the cone continuing longest visible.*

ZODIACAL LIGHT.

Dr. Forster gives the following succinct account of a remarkable luminous appearance in the heavens on Monday evening, the 29th of September, from Chelmsford. About eight o'clock on that evening my attention was drawn towards a bright band of light extending from the western horizon to the zenith or rather beyond it. It appeared to me to be a portion of an arc which had extended quite across the sky from west to east, as I could trace the faint remains of it almost to the eastern point. By half past eight however it was reduced to an arc of about 90°, beginning abruptly at about five degrees above the horizon at the point W.S.W. by W., and, after bending a little toward the south, extending itself across the zenith, and terminating at about five degrees east of it, fading into a sort of smoky appearance. This remarkable band of light was brightest at its lower or western part, and at above the middle, that is 45° of altitude, began to diminish in lustre; its average breadth was above three degrees; its colour a sort of reddish, giving the appearance of a column of brightly ignited smoke, or as if the reflected light of a great distant fire could be supposed carried in a circumscribed column into the air. It was brighter than any aurora borealis that I ever saw, and considerably excelled in brilliancy the light of some faint coruscations of that phenomenon which I observed at the same time in the north. Its duration was from eight to nine o'clock, when fading away and getting whiter as to colour, it disappeared. The thermometer standing at 57°. Barometer

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* Monthly Mag.

29·55. Wind W.—Observers in other parts of England, at first, discerned this phenomenon with the whole are extending across the heavens: others made its situation rather more south-west, while in some places it seemed to rise, by the gradual elevation of its western termination above the horizon. To me it seems that its elevation must have been very great; as the distance of a hundred miles, according to my comparison of observations, gave it no sensibly different apparent place. It must have been one of those very unusual electrical communications which take place parallel to the earth's convexity through the rare air of a region much above our more dense atmosphere, and which from cutting the horizon just above the place of the recently set sun, and occurring about the period of either equinox, has been called the zodiacal light, and vainly imagined to be a real emanation from the sun's light. It is in fact more allied to the northern lights than to any other phenomenon, and like those beautiful illuminations must be ascribed to effects of electricity whose precise local causes remain unknown. The most brilliant auroras have indeed usually happened about the time of the autumnal equinox. I may remark in conclusion, that on the same day and three hours previous to the light in question (Sept. 29,) some beautiful rainbows are recorded; and that during the night, small meteors called falling stars, which left trains of light behind them, are said to have been abundant.*

The same phenomenon is thus described by Davies Gilbert, Esq. President of the Royal Society:—

On Sept. 29, I was at Rosemorran, an elevated situation near Penzance, and about twelve miles from the Land's End. My attention was called to this unusual phenomenon at about eight o'clock. The belt then appeared to rise from the horizon, somewhat to the southward of west, and ascended with a steady light and uniform subtense, of perhaps three degrees, towards the zenith, passing over various stars that were scarcely altered in their appearance, till it reached Alpha Lyræ, then somewhat south of west, and nearly 62 or 63 degrees high. From thence diminished in brightness it became soon blended with the milky way, and ceased to be distinguishable. The belt seemed exactly similar to a ray of the northern light, except that not the least coruscation was to be observed. Its position could not be much out of the magnetic equator.†

AURORA BOREALIS.

On Monday night, December 1st, an aurora borealis was observed in London at intervals from six o'clock till after midnight. It first rose in the N.W. in the form of a segment of a circle cut by that part of the horizon, showed a bright flame-colour about twelve degrees high, and disappeared at half-past six. At seven it again appeared, brightest about the magnetic North, when seven or eight light red coruscations or columns of light rose from it perpendicularly, nearly due North, to an altitude of twenty degrees; and several small meteors fell in that quarter. At a quarter before eight it again disappeared, and re-appeared at ten, when several columns of light rose from its base, and it continued more or less bright till after midnight.

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* Phil. Mag.

† Ibid.

Its disappearing as above stated, may be attributed to the effect of an upper current of wind from the S.W., as ascertained by the motion of black clouds from that quarter. A very hard gale blew next the earth from the N.E. through the evening and night, with a sudden rise of the mercury in the barometer.*

ON THE COMET OF 1832.

SOME German journals predict the appearance of a comet in 1832, which must destroy our globe, and this has been copied and commented on by the journalists of other countries. The comet which is to appear in 1832, is the comet of six years and three quarters, of which the orbit was calculated in France, by one of our most distinguished astronomers, M. Damoiseau, member of the *Academie des Sciences*. All that has been said in Germany respecting this comet, is founded on the results obtained at Paris. Now, these results are so far from being terrifying, that they do not even leave the smallest possibility of an accident. The comet of 1832, in its shortest distance from the earth, will remain more than sixteen millions of leagues from it. It might come a thousand times nearer before any danger could be apprehended. In 1770, a comet came so near as 750,000 leagues (about nine times nearer than the moon.) Lalande estimates the distance at which a comet might produce sensible effects on the earth, at 13,000 leagues. Whence, then, comes the error of the journalists? Solely from the circumstance that the comet in question will pass very near the earth's orbit (at 4½ diameters, from 13,000 to 14,000 leagues;) so that, in fact, were the earth to be at the time in the part of its orbit nearest the comet, some alarming disturbances might ensue. It is unnecessary to say that so gross a misapprehension as that which we have just pointed out, was not committed by any astronomer. The only respectable publication in Germany on the subject, is a letter of *M. Olbers*, in which that astronomer gives an account of the results obtained by M. Damoiseau; and it is without doubt, because ignorant persons have seen in this letter that a comet will approach very near the earth's orbit in 1832, that they have persuaded themselves of its collision with the earth. At the present day, comets are not so general an object of terror as formerly. In proportion as the mass of the population becomes more enlightened, superstitious terrors of all kinds are less to be dreaded. The conjunctions of the planets, which were formerly the cause of much more violent, and still more unreasonable fears; and eclipses, which so long divided with comets the right of terrifying the nations of the earth, have been discovered to be incapable of producing any of the effects that were attributed to them. Of all these terrors, there only remains, with respect to comets, a possibility so extremely uncertain, that no rational person could conceive any apprehension on the subject. One thing which we must not omit to mention, with respect to comets, is, that the new data obtained respecting their constitution, are of such a nature as to modify, in a great degree, the ideas suggested by the possible occurrence of accidents resulting from their striking against the earth. These bodies, in fact, which were supposed to have a density many thousands of times greater than the earth, are in general formed of such slight materials that stars of the first and second magnitudes may be seen through them. The rapidity of their motion is another circumstance calculated to afford assurance against the disasters which they might occasion, since there results from it, that the time during which they might act upon us, would necessarily be very short, and would never exceed two or three hours, as Dionis Dusegour, M. D. has demonstrated.*

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* Phil. Mag.

DIURNAL COURSE OF THE THERMOMETER.

1. The mean daily course of the temperature of the atmosphere is the same at all hours, as is proved by the observations made by the officers of Artillery at Leith Fort, those of Chimenello in Padua, of Dr. Neuber in Apinrade, and of B. S. Dorta at Rio de Janeiro. 2. According to a yearly mean, the coldest hour of the day in Europe is five o'clock in the morning. 3. The warmest hour of the day, according to the Leith observations, is three o'clock in the afternoon, but the Padua observations make it two o'clock in the afternoon. 4. The progress of the heat is interrupted near to the maximum and minimum: the rise is most considerable some hours after the minimum, the fall some hours after the maximum. 5. The heat increases for 9-10 hours, decreases for 14-15 hours. 6. The greatest daily range of temperature in Europe is about 13° Fahr. 7. At Padua the daily medium is at 8 hours 41 minutes A. M., and 7 hours 52 minutes P. M.; at Leith at 9 hours 13 minutes A. M., and 8 hours 27 minutes P. M. 8. The greatest daily range of temperature in Europe takes place in July, and the least in December.†

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* Jameson's Journal.

† Professor Schow—in Jameson's Jour.

IMPROVED WATER CLOCK.

(See the Engraving.)

At the late exhibition of the National Repository (see page 78,) was the model of a very useful and cheap substitute for our expensive modern clocks of wheel work, such as any person may easily make for himself.

The engraving represents the machine in section; *a* is a cylindrical tube to hold the water, and *b* a float of cork on the surface, through which is passed the shortest leg of a narrow syphon *c*, which is suspended by a silken cord over a wheel *d*, and to the other end of the cord is attached a weight which nearly counterbalances the weight of the syphon; near to the extremity of the longest leg of the syphon is fixed an index that points out upon a graduated scale the hour, which is according to the degree of depression of the float within the tube. It is obvious that the syphon being thus supported by the float, and gradually sinking with the water as it escapes at the lowest limb, will continue to act uniformly from the top to the bottom of the tube, and consequently become a very accurate measurer of time. The water falls into a receiver *g*, that forms the base or stand of the instrument. The form of the apparatus renders it capable of being made very ornamental, and its beautiful simplicity and correctness of action, highly convenient and useful. The water from *g* may be made to run back into the column, by opening a passage between them, and inclining the instrument. An alarum may easily be applied to it in various ways. It is a clock that you may do what you please with, without injury to it; set it back, or put it forward, by pouring in or taking out the water; and it is instantly set to the required point. A clock might thus be made to go for a day, a week, or a month, at very little expense.

This ingenious machine is the invention of F. C. Partington, Esq.*

RAIN GAUGE.

(See the Engraving.)

A rain-gauge on a new and greatly improved construction has been invented by Mr. Samuel Crosley, engineer, London, and described in *Gill's Technological Repository*. Its superiority consists in its power of self-registering the quantity of rain fallen.

It consists of a funnel (*a*) of the usual form, through which the rain passes to a vibrating trough (*b*), when, after a sufficient quantity has fallen into its higher side (*c*) it preponderates, discharges the rain, which escapes by a tube, and at the same time, by its vibratory action, moves a train of wheel-work and indexes, to record upon a dial-plate the quantity of rain fallen. We have not been able to learn that any instruments of this sort are actually on sale; but the invention is most ingenious, and ranks with Kewley's balance thermometer, which might also be made a registering thermometer on a similar principle.

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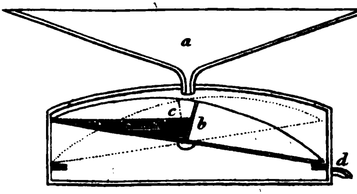
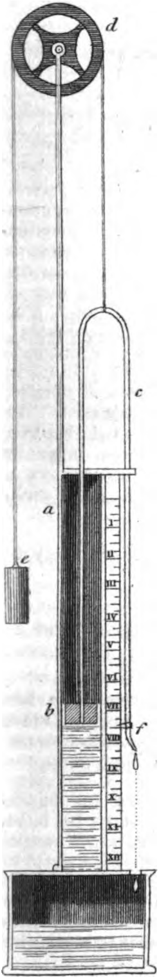
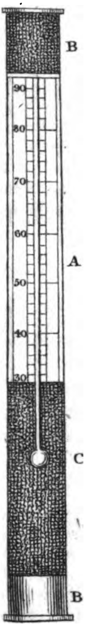
* Register of Arts.



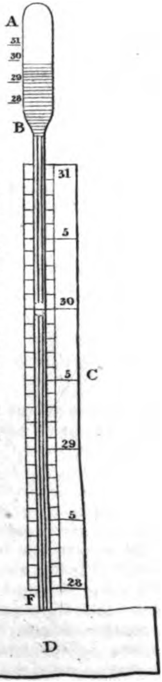
Crossley's Rain Gauge. p. 207.



Water Clock. p. 206.



Dr. Cumming's Hygrometer. p. 207.



Improved Barometer. p. 207.

DR. CUMMING'S NEW HYGROMETER.

(See the Engraving.)

A. Glass Tube 8 to 12 inches long. BB. Brass mountings. C. Thermometer bulb.

The hygrometer is extremely simple, and is intimately founded on the principle pursued by Mr. Dalton in his mode of interrogating Nature. But instead of using "a tall cylindrical glass jar, with water fresh from the well, and artificial cold mixtures," the accelerated evaporation of æther, or of a less costly article, rectified spirit of wine, is employed, by directing a current of air through a thin glass or metallic tube, of convenient size, containing a delicate thermometer enveloped in sponge or other porous substance: when it will be obvious that, by the affusion of a little æther upon the porous body surrounding the bulb of the thermometer, almost any degree of artificial cold may be produced by simply mounting the prepared tube upon the nozzle of a small pair of bellows, or other pneumatic contrivance; thus rendering, by the abstraction of heat from the tube employed, the condensation of aqueous vapour upon its exterior surface, a matter of ease, certainty, and expedition, while the comparison of the temperature of the air, at the commencement of the experiment, with the mean of the indications of the thermometer at the appearance and at the evanescence of the dew, opposite to the bulb of the thermometer, will give, with relative accuracy, the measure of the force of vapour in the atmosphere.*

IMPROVED BAROMETER.

(See the Engraving.)

A correspondent of the *Mechanics' Magazine* suggests the following improvement in the construction of barometers:—

Suppose a barometer tube A F, filled with mercury, in the usual way, the area of the bore in the upper part, A B, exceeding that of the other part in any known proportion, say as 7 to 1. It will scarcely be doubted but that the mercury will stand at an equal height, and be acted upon by any change of the atmosphere, exactly the same as if the tube were of a uniform bore throughout. This being granted, let a small cylindrical piece of polished ivory, having a strong black mark round the middle, to serve as an index, be introduced during the filling of the tube, which suppose to occupy the space C; the ivory should be made as large as the tube will admit, yet so as to slide without friction; it is evident then, that if the mercury rise *one* inch in the part A B, the index C must move through a space of *seven* inches in the same time. The range of the scale of the present barometers is but *three* inches, whereas this method would enlarge it to *twenty-one* inches. These inches may be divided into tenths, and again subdivided, by means of a Vernier Scale, so as to note the smallest variations in the atmosphere.

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* Brande's Journal.

INTENSE COLD.

The lowest temperature witnessed by Capt. Franklin in North America was on the 7th of February, of the second winter passed on the shores of Bear Lake. At eight o'clock in the morning, the mercury in the thermometer descended to 58° below zero; it had stood at —57.5°, and —57.3° in the course of that and the preceding day; between the 5th and the 8th, its general state was from — 48° to — 52°, though it occasionally rose to — 43°. At the temperature of — 52.2°, Mr. Kendall froze some mercury in the mould of a pistol-bullet, and fired it against a door at the distance of six paces. A small portion of the mercury penetrated to the depth of one eighth of an inch, but the remainder only just lodged in the wood. The extreme height of the mercury in the tube was from 71° at noon to 73° at three o'clock.*

POWER OF THE SUN'S RAYS.

Mr. Mackintosh, contractor for the government works at Stonehouse Point, Devon, lately had to descend in the diving-bell with workmen, to lay the foundation of a sea wall. The machine is fitted with convex glasses, in the upper part, to serve the purpose of windows; and Mr. Mackintosh states, that on several occasions, in clear weather, he has witnessed the sun's rays so concentrated by the circular windows, as to burn the labourers' clothes, when opposed to the focal point, and this when the machine was twenty five feet under the surface of the water! †

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* Quarterly Review.

† From the MS. Journal of the Bristol Nursery Library.

AGRICULTURE, GARDENING,

AND

RURAL ECONOMY.

Breeding of Live Stock.—Dr. Sturm, Professor of Agriculture, and Director of the Agricultural Institution at Bonn, has lately published a work on this subject, in which he deduces, from the phenomena related, the following, among other, principles: "The male parent is the preserver and creator of a race. The first changes in crossing are always exhibited in those parts that possess the power of being reproduced, as the hair, horns, hooves, &c. The fleshy parts change slowly, in proportion as the mother has much of the blood of the original race. The first changes take place in the head, and are gradually developed towards the hinder quarters of the animal. The author also maintains, that to produce a new race, as many generations are necessary as years are for perfecting their teeth."—*From the French*.

Destruction to Crops.—It is the duty of every one who would wish to see the produce of the earth appropriated to its legitimate purpose, to try and keep all kinds of vermin, including game, within moderate bounds; and if proprietors will not permit crows to be destroyed in the rookeries near their mansions, either by shooting at the "branchers" or pulling down the nests after the young are just hatched, which is perhaps the most effectual way to destroy them, it is highly expedient that the farmer should use those means which are in his own power to deter them from committing ravages on his crops.

One method of destroying numbers of crows, is to place barley steeped in a solution of arsenic, on the newly taken out dunghills, and they will eat it unwittingly, with avidity, and thereby pay the forfeit of their lives for their temerity; but this mode can only be successfully practised in winter, for it will not entice them in seed time and harvest. Scarecrows are useless, after they have stood long enough to be recognised. Gunpowder is the only source of terror to crows, and to apply it in the most effectual way is yet a desideratum. To station a man constantly with a gun becomes expensive; and, besides, he cannot be out early enough in the morning in summer to effect his purpose.—*Quart. Journ. Agricult.*

Salt.—Mr. Brande, in his recent Lecture on Vegetable Chemistry, says, "Salt has been very much extolled for a manure; I believe that a great deal more has been said of it than it deserves; it certainly destroys insects, but I do not believe what has been said of its value. We are not to infer that because a manure is found to be useful on one soil in a certain climate, that it shall prove equally useful in others; experience must direct us in this particular."

Extraordinary Cow.—A cow belonging to Mr. Gervais, a French agriculturist, produced nine calves at three successive births, viz. four at the first, all vigorous females, in 1817; three at the second, of which two were females, in 1818; and two females in 1819. All these calves, except two of the first birth, were nursed by the mother, and when grown up, produced only one calf as usual. Nothing is said of the age or condition of the cow or the bull.—*From the French.*

On the Live Stock of Britain, France, &c.—Dupin, in a work lately published, with a view to promote the numbers and breeds of the live stock of France, states, that, in Britain, the animal power is eleven times as great as the manual power; while in France it is only four times as great; hence, French labourers receive from animals only a third part of the aid yielded by them in Britain. He also states, that Great Britain consumes three times as much meat, milk, and cheese, as France. The following is the number of horses for every 1,000 inhabitants in the countries mentioned. Hanover, 193; Sweden, 145; Canton de Vaud, (in Switzerland,) 140; Great Britain, 100; Prussia, (six provinces) 95; France, 79. Numbers, however, give a very imperfect idea of the relative amount of horse power, the breeds being so various in the different countries.

Insects on Trees.—Mr. Johnson, of Great Totham, is of opinion that smearing trees with oil, to destroy insects on them, injures the vegetation, and is not a certain remedy. He recommends scrubbing the trunks and branches of the trees every second year, with a hard brush dipped in strong brine of common salt. This effectually destroys insects of all kinds, and moss; and the stimulating influence of the application and friction is very beneficial.

Bone Manure.—The general practice is, to use bones on dry light soils, where the turnip can be eaten off the ground with sheep, in such proportion (not less than one-half) as may be reckoned necessary to manure the ground for an after crop of oats or barley. The quantity of bone manure may be varied from 15 to 25 bushels of dust per acre, according to the state of the land. Some difficulty was at first found in depositing the bones, so that the plants might reap all the benefit of it; but this is now obviated by the application of two additional hoppers and spouts to the turnip sowing machine, which conduct the manure and seed in the drill at the same time, and with the same expedition as sowing the seed by the old machine. Doubts have been raised whether the succeeding crops of oats or barley is in any degree benefitted by the small quantity of bones used in growing a crop of turnips. A writer in the "Quarterly Journal of Agriculture," says, I can confidently state, that on my farm both the quantity and quality of my barley particularly, have been improved, and the grass for the first year is a fortnight earlier in its growth than after other manures. Experiments have been made by some enterprising farmers in Strathmore, as to the value of bones when applied to corn crops, and the results have been more or less satisfactory, as the season was favourable or otherwise. All agree that the other crops have by no means benefitted so much as the turnips; and I am of opinion that there is no way of applying bone manure with the same advantage as to this crop. The season of the year when it is deposited into the soil, and the nature of the plant, are strong reasons for this opinion. Although the use of bone is annually extending, yet the industry in collecting seems as yet to keep pace. The price has varied but little during the last five years, bone dust being easily got at from 2s. 6d. to 3s. per bushel, according to the distance of carriage of the bones for grinding.

Manure for Wheat.—Dr. Joseph E. Muse, M.D., President of the Dorchester Agricultural Society, in an address delivered before that body, Nov. 9, 1826, states the opinion, that animal manures are peculiarly necessary for wheat crops.—*Silliman's Journ.*

To Prevent Swallows Building in Window Corners.—If the places where they usually build be rubbed with oil or soft soap, it appears from experiments made at Granton, that swallows will not only soon desist from attempting to build the nests in the unctuous surface, but refrain from doing so long after the oily or soapy matter has been carried off.—*Edinburgh New Philos. Journ.*

To Preserve Young Turnips from the Fly.—When two kinds of turnip are sown in the same field, those which are the most tender and succulent will chiefly suffer from the fly. A like distinction will be observed, if only one kind be sown, but the seed unequally scattered. Those plants that rise in clusters, protect one another from the sun and air, and offer a more agreeable food to the fly than those which come up at greater respective distances. Reasoning from these well known facts, Mr. Poppy, (to whom the Society, whose transactions are afterwards referred to, voted the Ceres Gold Medal for the discovery,) was induced to drill four acres on his own farm, employing one pint of Swedish turnip seed per acre for those rows intended to stand for a crop, and half a peck of common turnip seed on the rows alternating with the former, and intended to attract the fly from them. The result was, that the thin sown Swedish turnips were not sensibly injured by the fly, while the thick sown ones were quite black with swarms of this insect. After the Swedish turnips had got into the rough leaf the danger from the fly being over, the rows of common turnips were ploughed up, and the crop being afterwards managed in the usual way, turned out very good, whilst all the other turnips in the parish sown at the same time, in the usual manner, totally failed. Another experiment was made in the neighbourhood of Blandford in Dorsetshire, the result of which was, the only good crop of turnips obtained during the last year in that part of the country.—*Trans. Soc. Arts.*

Cold Caves.—On the banks of the Lake of Lucerne, and at the foot of one of the bases of Mount Pilato, are little wooden huts (except the back wall of stone) used as cold caves. On July 31, the heat in the shade was 73.2°, and within the huts 30½°. Milk could be kept for three weeks, meat for a month, and cherries for twelve months. In one hut snow was preserved all summer.—*For. Rev.*

Turf.—A correspondent of a French work on gardening thinks that green turf may be obtained in France by trenching the ground, freeing it from stones, covering the surface with two or three inches of rich compost, and then laying on the turf. The improved soil, he thinks, will retain moisture sufficient to keep the turf growing all the summer, and, consequently, green.

On Planting Poor Light Land.—Besides paring and burning, and trenching the soil previous to making the plantation, Mr. Withers (who received the large silver medal from the Society for the Encouragement of Arts, &c. London, for experiments conducted on the subject in Norfolk,) spreads on it marl and farm-yard dung, as for a common agricultural crop, and at the same time keeps the surface perfectly free from weeds by hoeing till the young trees have completely covered the ground. The progress that they make under this treatment is so extremely rapid, as apparently to justify, in *an economical point of view*, the extraordinary expenses that attend it. In three years, even oaks and other usually slow growing forest trees have covered the land, making shoots by three feet in a season, and throwing out roots well qualified, by their number and length, to derive from the subsoil abundant nourishment, in proportion as the surface becomes exhausted.—*Trans. Soc. Arts.*

Potato Flour.—The farina, or meal, obtained from potatoes is now regularly sold in the markets of Scotland. It is *stated* to be quite equal to genuine arrow root; but this is quite a mistake, unless the nutritious properties of arrow root have been over-rated. Sir John Sinclair has devoted much of his time to the preparation of the flour; but as we gave his process in our last volume, it is not necessary to repeat it here.—*Mirror.*

Agricultural Wages.—Table of weekly wages paid in a particular district, to agricultural labourers, for the greater part of the last thirty-five years, together with the annual average of the price of wheat, and the quantity of it that their weekly wages enabled them to buy :—

Years.	Week's Wages in Money.	Week's Wages in Wheat.	Price of Wheat.
1790	10*s.*	6½ Pecks	48*s.*
1795	16*s.*	7¼	71*s.*
1800	21*s.*	6¼	105*s.*
1805	18*s.*	6½	87*s.*
1810	21*s.*	6¼	105*s.*
1815	15*s.*	7½	64*s.*
1816	16*s.*	6¾	75*s.*
1817	19*s.*	6½	94*s.*
1818	18*s.*	6¾	83*s.*
1819	16*s.*	7	72*s.*
1820	14*s.*	6¾	65*s.*
1821	8*s.* to 12*s.*	5 to 7½	54*s.*
1822	7*s.* 6*d* to 10*s.*	5½ to 7½	43*s.*
1823	8*s.* to 11*s.*	5 to 6¾	51*s.*
1824	12*s.*	6¼	62*s.*
1825	14*s.*	6¾	66*s.*

This table is given by Mr. Cayley, upon the authority of Mr. Robert Merrey, a very intelligent practical farmer and landholder of Lockton, near Pickering.—*Quarterly Review.*

Gardeners.—In Germany, and other northern states, it is customary for those who devote themselves to gardening to serve an apprenticeship of three years in a royal garden. After that period is completed, they receive an indenture, elegantly written on parchment, with the head gardener's name, or sign and seal attached.

Agriculture on the Continent. By James Boswell, Esq.—On comparing the agriculture of the continent with this country, we are struck with the miserable manner in which the operations of the plough and harrow are conducted; but the great deficiency is a total ignorance of what we call green cropping on the large scale. It is true that both potatoes and turnips are made use of in different countries, but I have never seen them properly cultivated, and consequently never approaching to a full crop. In Flanders, Prussia, Germany, and in the Swiss cantons, there is no one who holds land but grows a portion of potatoes; but they are planted either by the hand on a flat surface, or put in with a spade, so close, that, instead of horse-hoeing, it is wonderful to me how they can get them hand-hoed; the consequence of which is, that the potatoes never reach the size of a common egg. Turnips are also cultivated, but in such a way, as to make a heavy or good crop out of the question. But the measure of bad farming is filled up by the slovenly, rude method by which they thrash out the corn, still making use of cattle or horses (at least in all the southern parts of Europe,) to tread it out, as we read in the Scriptures.—*Quarterly Journal of Agriculture.*

Receipt for making Cheese in imitation of Double Gloucester.—It is material to have good rennet made from calves' stomachs, properly cured, for curdling the milk, the method of doing which is known to every good housewife. The milk immediately from the cows must be put through a strainer into a tub sufficiently large to hold the quantity of milk required for the cheese intended to be made. Put first into the milk a quantity of the finest cake-arnotto, which is manufactured in London for the purpose of colouring cheese. This is done by tying it in a piece of thin muslin, and immersing it in the milk, and shaking it till the milk is tinged to the colour you wish your cheese to be. The quantity used in the specimen produced is noted below. Pour into the milk a sufficient quantity of the rennet, to coagulate or curdle it, but not more; and allow it to stand till the curd is quite formed, when it may be cut or broken with a knife, and the whey taken out with a skimming dish. The curd must be made firmer by degrees, taking out the whey by pressing it with the hands into one side of the tub. After this operation the curd is cut in pieces of about an inch square, and put into a cloth; then put into a large wooden drainer, which has a cover of a size to go within the drainer. A weight of about half a hundred weight must then be laid on the top of the cover, which presses the curd moderately. After remaining fifteen to twenty minutes, take the curd out, and cut it again into similar pieces, or rather smaller, putting it again into the drainer, and press it as before. Take it out again in about twenty minutes, repeating the same process as before. Take it then out of the drainer, and put it into a tub or vessel, and cut it as small as birds' meat, with a knife made for the purpose, having three blades, which facilitates the operation. The curd is then salted with the best salt, and well mixed, as much as is considered necessary. It is then put into a cloth of thin gauze made for the purpose, and put into chessel or chess, and then into the press, taking it out from time to time, and giving dry cloths, till, by the pressing, the cloths come off quite dry, which is the rule for knowing when it is enough pressed; but it is perhaps an advantage to have so many presses as to allow the cheese to remain two days or upwards. If the last cloth is of a finer texture, and dipped in warm water, wringing it before putting it on the cheese, it will give it a finer skin. It has been omitted to state, that, while the curd is pressing in the drainer, it ought to be set before a good fire; and also, after putting it into the chesset, it ought to be placed there for twelve or fifteen hours, with about half a hundred weight on it, previous to putting it into the cheese-press. The cheese, after taken out of the press, should be laid on a tolerably dry floor, or shelves, the former perhaps preferable, so as not to dry them hastily. They ought, in the first instance, to be turned daily, and rubbed with a dry cloth. After becoming firm, their being turned and wiped twice a week will be sufficient. It is of great use, to keep flies from coming near the cheese and breeding maggots, to rub the floors or shelves with elder or bour-tree leaves. The quantity of arnotto used in the specimen lately produced to the Highland Society of Scotland, was one cake of about one quarter of a pound weight to ten cheeses, of 20 to 22 pounds each; and the quantity of salt about 8 or 9 ounces. 100 quarts of milk are found to make a cheese of 30 pounds, or about 3 quarts to 1 pound of cheese.—*Trans. Highland Soc. Scotland.*

Planting.—In the "Memoirs of the Caledonian Horticultural Society," part. i. vol. iv, there is a paper by Mr. Hosie, of Lyndoch, on the management of oak coppice woods, from which the following is an extract:—"It has been recommended as a most advantageous way of rearing woods, to sow them at once upon the spot where they are ultimately to remain, particularly the oak, as it would not disturb what is called the tap root. Having tried that method, both with regard to oak and the pine tribe, it was found most decidedly not to be the most profitable way; and, as to disturbing the tap root, it will be found, by whoever takes the trouble to examine, that it is only to a certain depth, and where the soil suits, that it takes a perpendicular direction, a horizontal one afterwards being the most natural. As to the difference of expense betwixt sowing and planting, let it be considered that, within the compass of a few square yards, as many trees can be raised as would plant some acres, and at a trifling expense; while, by sowing a large plantation at first, the extra expense of seed alone would nearly counterbalance that of planting, besides other disadvantages, such as the young plants being thrown out by the frost, particularly the pine tribe, and the loss of the growth of a year or two, which may be saved by planting stout plants. I have no doubt that, for an oak-wood, the most profitable way is to get stout plants, if possible, of two or three feet high at first planting; but, in making up an old plantation, if they are four or five feet high, so much the better."

German Method of procuring Flowers in Winter.—According to the "Recueil Industrielle," the following method of expediting vegetation at will is practised in Germany:—A branch, proportioned to the size of the object required, is sawn off the tree, the flowers of which are to be produced, and is plunged into a spring, if one can be found, where it is left for an hour or two, to give time for such ice as may adhere to the bark to melt, and to soften the buds; it is then carried into a chamber heated by a stove, and placed in a wooden vessel, containing water; quick-lime is to be added to the water, and left for twelve hours. The branch is then to be removed into another vessel, containing fresh water, with a small quantity of vitriol, to prevent its becoming putrid. In a few hours the flowers will begin to appear, and afterwards the leaves. If more quick-lime be used, the flowers will appear quicker; if, on the contrary, none be used, the branch will vegetate more slowly, and the leaves will precede the flower.

Salt.—Crops are in general lighter in proportion as the quantity of salt is larger, which leads directly to the conclusion that salt is injurious to vegetation; and it certainly is so when too freely applied, but in small quantities it is useful. The way in which itis most calculated to do good, is when mixed up with the dunghill in trenching, in about the proportion of from twenty to twenty-eight parts of salt to a cubic yard of the untrenched dunghill, and although it may not increase the apparent bulk of the crop, it will improve the quality. The barley manured with salt appears to be heavier in the grain, in proportion as the quantity of salt is large.—*Gardener's Magazine.*

The Lime Tree has been often considered merely as an elegantly formed and striking ornamental tree for avenues and lawns near gentlemen's country seats; and the timber of it has been thought of little value, so little indeed, as hardly to be marketable. But the Tilia Europæa, though not, perhaps, a native of Scotland, is indigenous in Essex, Lincolnshire, Surrey, and Sussex; and the timber possessing many excellent properties for the purpose of beautiful and durable carved work, must also be valuable in many other respects. It has not been found liable to cracks, or to the worm, after standing nearly two centuries; and still preserves the original elegance of form, as carved in imitation of flowers and fruit, by Gibbons, in the choir of St. Paul's, and at Windsor Castle; so that not a doubt can exist of the value of this Linden tree for timber, as well as ornament; and, for the fragrance of its flowers, it is well known, as described by Sir James Edward Smith. On these flowers bees feed largely; and though the value of the bark is not fully known for the purpose of tanning, it has been found to afford materials for making coarse ropes. On the whole, no error can be greater than is often committed, in considering this elegant tree as of no farther use than for ornament; the red lime-tree of England, possessing many other properties, in respect of its elegantly coloured, and durable timber especially, which ought farther to recommend it to attention, and to take it out of the class of supposed inferior timber trees.—*Trans. Highland Soc. Scotland.*

Culture of Aquatic Plants in China.—The Chinese take advantage of their lakes, pools, and rivulets, by cultivating different aquatic plants in them, many of which are considered as food. The government has planted these vegetables in the lakes, marshes, and uncultivated watery grounds belonging to the state, and the emperor has introduced them into all the canals of his gardens. These and other aquatic vegetables may generally be introduced into Europe, for they are not so sensible of changes in climate as those which grow in the earth.

Eradication of Meadow Saffron.—Colchicum, or meadow saffron, is highly injurious in meadows, in consequence of its poisonous qualities, especially when green. Instances are not at all uncommon of cattle, pigs, &c., being poisoned by it. It is not easily eradicated, propagating itself readily both by its seeds and roots, and the latter lying deep in the earth. The best method is to pull it up in the beginning of May, before the seeds are ripe. It is only necessary that the stem should be separated at the neck of the bulb, for it has been ascertained that then the plant no longer has the power of reproduction.—*From the French.*

The "Fly" in Sheep.—The first part of the treatment of this malady will naturally be to prevent the fly depositing its eggs. This, as it often depends on the sheep being unwell, will require the employment of means suited to alleviate each particular disease. If it should be induced from a sore or wound, a little simple ointment, lard, or oil, ought to be rubbed on it, and a small quantity of tar put near it, or on the top, but never rubbed into the wound or even the skin, as is the common practice; for by so doing the animal is burned as with a hot iron, and its recovery more or less affected. Much good may be done by driving the flock to the high grounds during the heat of the day, or keeping them feeding in a dry situation, where they are cooled by the wind, avoiding always exposure to the rays of the sun in low situations. Rubbing tar on the wool is a practice which, for many reasons, if possible, it is desirable to avoid; but when these means fail, it becomes absolutely necessary, and, if properly used, will not injure much of the wool. It ought to smell strong of empyreumatic oil, as it is by its strong disagreeable smell preventing the fly approaching to deposit her ova, that it acts here, and not by killing or poisoning; a little streaked on the horns, ears, or tail, might perhaps be sufficient. Quicklime in powder, when it can be procured, may be dusted on the parts likely to be affected; of course, dirty or wet wool ought always to be carefully clipt off, and this alone will often be sufficient. It would be useless to mention the multifarious remedies which are used in different places. In the north of England a weak mercurial ointment is often used; in the Highlands it is common to rub wet clay or mould on the sore parts, so as to cover them and fill up the holes dug by the worms, and this certainly is better than cramming them with tar.—But whilst in this way we protect the sheep, endeavours must be made to restrain the increase of the insects within due limits, and to remove those causes which induce it to deposit ova even on healthy sheep. This may be done in a great measure by removing from the pasture grounds the carcasses of such sheep as die from whatever cause, and carefully burying them, so as to prevent the fly getting at them.—*Quarterly Journal of Agriculture.*

Spanish Asses.—The Duke of Buckingham has, at his seat at Avington, a team of Spanish asses, resembling the zebra in appearance, which are extremely tractable, and take more freely to the collar than any of our native species.—*Farmer's Journal, May.*

Large Trees.—In February last, an ash tree was felled in Blackburn Hollows, near Shiresgreen, Yorkshire, containing 750 feet of solid timber; it was 10 feet 6 inches across the stool. An oak tree was also felled in Shiningcliff, near Crich, Derbyshire, containing 965 feet, and 13 feet 4 inches across the stool.

Fine Bull.—In the "Magazine of Natural History," July, 1828, is described a particular variety of bull exhibited in London. The owner says it was brought from Africa to Bordeaux when a calf; and after having been shown in different parts of the continent, was taken to London, and exhibited at the Bazaar in King-street, Portman-square, in the autumn of 1828. In July last it was five years old, 4 feet high at the shoulders, and

7 feet in length, from the horns to the insertion of the tail. The length of his face was 1 foot 8 inches, and the girth round the collar 7 feet 6 inches. His hair was short and silky, and the colour a cream or yellowish white, except two black tufts on each foot. On the back of the neck was a hump or swelling, which seems confined to this variety.

To destroy the Red Spider in Hot-houses, &c.—Take half a pound of flower of sulphur, kill it with a little milk, add half a peck of hot lime and two small balls of whiting, and mix it well with water, until it attains the thickness of whitewash, when it is fit for use. Then with a brush wash the flues and every part of the house, which is of brick, with this mixture. The general practice is to wash the houses with this mixture in the month of February or March; but, should they require a second washing, which is seldom the case, they may be done at any time when the fires are on, with the greatest safety, only using it sparingly for five or six feet from the furnaces.—*Gardener's Mag.*

Parasite Sycamore.—At Kinmel Park, Denbighshire, an oak, twenty or thirty years ago, lost one of its largest branches by the wind, and a partial decay was the consequence; a key from a neighbouring sycamore fell into the fracture, which, vegetating, has formed for the old mutilated oak a new head. This parasite appears to have so completely seated itself, that, though the place of its first lodgment is 12 feet from the ground, our informant thinks that its roots will very soon penetrate to the earth, and at last destroy its venerable nurse.—*Ibid.*

Horticultural Society.—On December the 18th, 1827, some specimens of apples were exhibited before the Horticultural Society, which, it was stated, had been altered in external appearance by the influence of other kinds, the blossoms of which hung near them. This is a fact, which, if true, is utterly inexplicable to the philosopher.

Asparagus.—The Horticultural Society have produced fine asparagus in open beds, by a method employed in all the north of Europe, but little known here. This consists in filling the alleys of common asparagus beds with hot dung, and covering the beds with the same material, protecting the whole with mats in bad weather.

Grafting pears upon quince stocks, instead of upon their own species, increases the produce on the average as 7·6 to 1 in favour of the quince; and in one case it has been found as 15·1 to 1. Pears grafted upon the quince have also the merit of not occupying so much space as others; but it is to be doubted whether they be as long lived.—*Trans. Hort. Soc.*

Grapes.—The method of training vines at Fontainbleau, where the famous grapes are produced that supply the Paris markets, consists in allowing the plants very little room to grow either with their branches or their roots, and in keeping the latter very near the surface of the ground; each vine is only allowed to occupy a space of about six feet, so that the walls are supplied by a multitude of plants, instead of by a few, as with us. —*Proc. Hort. Soc.*

Citron.—An extraordinary fruit of the Madras citron was lately exhibited before the Society. It was fully as large as a child's head, and excited much curiosity.

Potatoes.—Mr. Knight, president of the Society, recommends potatoes to be planted very close in the rows, but the rows very distant from each other.

Beehive.—The model of a beehive from New Brunswick, in New Jersey, has been exhibited to the Society. It consisted of a square wooden box, opening at the bottom, and fixed upon a framed stand; a shallower box was adapted to the top of this, into which the bees were to work when the lower part was filled. The bottom of the box was in the figure of an inverted pyramid, and sloped off so as to drain the interior effectually.

Pine-Apples.—Mr. Knight has succeeded in growing pine-apples without the aid of tan, and has exhibited specimens which were exceedingly well grown and high-flavoured.

Curious method of preserving Apples, &c.—In autumn, when the apples are gathered, they are laid on square wicker hurdles constructed for the purpose, and which fit into a frame, one above another, upon ledges, so that those above do not rest on the fruit below. The lowest tier of fruit must be high enough from the ground to permit a fire of brushwood to be kindled below. The frame may be made to hold six or eight hurdles, and when overspread with fruit, each placed separately, its sides are covered with mats, to keep the smoke closely and longer within. The fire is made of vine branches, and continued till the fruit are, as it were, glazed over with the fuliginous matter from the fire. The apples are then wrapped up singly in paper, and packed in chests or barrels, to be kept for use. These packages require looking over occasionally during winter, to free them from any decayed fruit, which would injure those that remain sound.—[The pyroligneous acid seems the preservative agent in this process.]—*Gard. Mag.*

Blue Hydrangeas are produced by planting them in a compost of bog earth and turf-ashes, or ashes of the Norway spruce fir.—*MS. Jour. of Bristol Nurs. Lib.*

Culture of the Tree Rose.—Procure and plant stocks in November; age is of less consequence than that they be free from knots. Free-growing roses should be planted on free-growing stocks. The most desirable heights are, 4 feet, 3 feet, 2 feet 6 inches, 2 feet, 1 foot 6 inches, and 1 foot. Cut over the stock at an angle of 50°, a quarter of an inch above the bud; if you cut at a greater distance, so as to produce a more slanting section, the wound will not heal so readily. Cover the wound immediately with loam or grafting clay, thus composed: five-eighths black pitch, one-eighth resin, one-eighth tallow, and one-eighth bees'-wax; or one-half bees'-wax, and one-half-pitch; or 1 pound white Burgundy pitch, ¼ pound black pitch, ¼ pound resin, ¼ pound bees'-wax, 2 ounces tallow, 1 ounce pounded mastic, and 1 ounce saltpetre. Warm either of these mixtures in a small pipkin, and leave it to melt for three-quarters of an hour; when melted, and not too hot, dip the extreme point of each stock in it, so as to leave the thickness of two or three sheets of paper of mixture at the end; but, if your stocks are planted, use a brush.

When the stocks begin to push in March, rub off all the buds but two, three, or more, well placed, close to the top, so as to indicate a handsome head. On the 1st of July move off the thorns from the places in the young shoots, where you intend inserting buds. Bud from the beginning to the end of August, unless from severe drought the bark will not rise. To aid this, in dry seasons, water at the root for several days previous to commencing the operation. Prefer mornings and evenings, and avoid a drying
r easterly wind, which dries up all the tender parts exposed to it.
n mode of budding in England is called, by the French, bud-

ding *à l'œil dormant;* budding *à l'œil poussant* is practised at the end of May, sometimes with common roses, which it is desirable to increase as soon as possible, but more frequently with Chinese roses, Noisettes, Banksias, and the like. Of course, it is the autumnal bud and bark which are taken.

Budding may be performed on the body of the stock, especially when the bark is not very hard. Not one bud in ten ought to fail. In general two are enough for a tree. The ligatures may be removed, in most seasons after a month, but in hot weather not for six weeks at least.

Tree roses are pruned in the first week of March; "leave a couple of buds on every shoot of last year's growth, or three, at most, upon a very strong one. If the tree be not pruned at all, it will lose its shape entirely in a single year, afford little or no bloom the next, and eventually straggle to death." Cut about the thickness of a sixpence above the bud, and at an angle of 45°, i. e. so as to form such a slant as would be made by dividing a square from angle to angle. "Cutting out old wood should always take place where it can," the desirable point being to keep young shoots direct from the old head, or from two or three strong branches. "This principle well applied, will always keep the trees in bounds; but as this requires judgment, and cannot well be explained in writing, take a lesson upon the subject, the first convenient opportunity, from a scientific gardener."

In planting out tree roses, they never look well in a clump; and, therefore, single plants, or some sort of lime, is preferable; or you may place different heights in succession, so as to look like a sloping bank. A three feet standard is in good keeping with the head it carries, and is the proper height in confined situations; distant from the eye, the height may be greater.

To graft the rose, collect scions in March, stick them in a lump of clay 1 inch deep; press the clay firmly to them; then put the lump of clay in a potful of earth, leaving the shoots out, and cutting off their points, if any are growing, to prevent exhaustion; and set them in any shed or out-house, neither very dry nor very damp, for three weeks. The object of laying by the scions thus is, that the stock may be the forwardest. Graft in the cleft manner. "In the event of your having neglected to procure stocks, the operation of grafting [or budding] may be performed equally well upon plants in a neighbouring hedge, and those which succeed can be transferred to the garden at leisure." The great enemies to the rose are the Aphides; the readiest method to remove which is, to brush them off with a common painter's brush.—*Abridged from Practical Instructions for the Formation and Culture of the Tree Rose, in Gardener's Mag.*

Melon-beds made of Leaves.—Leaves (except those of the beech) are collected in the woods in winter, kept dry, and put into a trench about the beginning of April. Holes, 3 feet apart, are made along the middle of the bed; these are filled with compost, to receive the plants previously raised; stop them in about a fortnight, and soon after cover the whole bed with tiles, which keep in the heat and moisture, and on which they grow and fruit well.—*Ann. de la Soc. de Hort. de Paris.*

The Art of improving the Quality of Fruits is said to have originated in Belgium; and while the Academy of Munich were doubting the possibility of this description of improvement, and even giving a prize to an essay which maintained the negative side of the question, the art had already made an immense progress in the Netherlands. It is not meant that new fruits were never raised from seed before, but that the business of raising new sorts of fruits from seeds was never before undertaken on scientific principles. Chance has, at all times and in all countries, discovered new sorts of fruits from seeds which have sprung up accidentally; but it was only in Belgium, towards the latter end of the 18th century, that seedlings were raised in large quantities with reference to this object.—*From the French.*

Pine-apples grown in Dung Heat.—In the autumn of 1827, M. Lindegaard tried the experiment of growing some pine plants in dung heat, in a pit made of boards, and surrounded by linings. The plants stood the very unfavourable autumn and severe winter remarkably well, and are now, without exception, the finest in Denmark. M. Lindegaard, I believe, had no idea they would have succeeded so well, and I am now convinced we may grow as fine pine-apples here as you do in England. As soon as I get a good situation I hope to prove this.—*Letter from Copenhagen, March* 28, 1828.—*Gard. Mag.*

Rapid Vegetation in the United States.—Some English peas brought out by the British brig Catherine, Donald, from Liverpool, were sown by Mr. Cooper, of St. Simmonds, (Georgia,) on the 10th of January. On the 27th of February, that gentleman sent Capt. Donald a peck of fine green peas, the produce of the same seed. An apricot, measuring 3¼ inches in circumference, which grew in an open garden in New York, was exhibited at the Meeting of the Horticultural Society, on the 22nd of April. Such is the rapid progress of vegetation in this country.—*New York Evening Post, April* 23.

Smut in Wheat.—We have compiled the following Table, exhibiting the highly infectious nature of smut, and the good effects of pickling, from a paper in the "Farmer's Journal," for June, 1828, by Mr. S. Taylor, jun.:

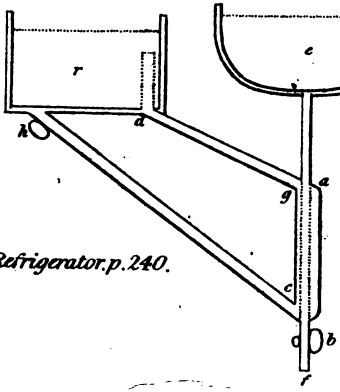
I. Wheat merely put into the bag where smutted wheat had been.—Old wheat, 1 in 30 smutted; New Kentish red, kiln-dried, 1 in 20; Yellow Lammas, kiln-dried, 1 in 3; Spring wheat, having a small quantity of smut-powder shaken amongst it, more than 1 in 2.

II. Wheat, when moistened, rubbed with smut-powder.—Old red wheat, 1 in 7 smutted; New red wheat, 1 in 6; New red wheat, kiln-dried, 1 in 8; White wheat, kiln-dried, 1 in 3; Yellow Lammas, kiln-dried, 1 in 7; Spring wheat, kiln-dried, 8 in 10.

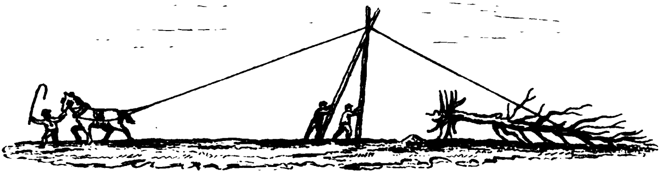
III. Treated as in the last experiment, but washed, previous to sowing, in a solution of vitriol and chamber-lye.—Old wheat, 1 in 2,000 smutted; New wheat, clean; New wheat, kiln-dried, clean; White wheat, kiln-dried, clean; Yellow Lammas, kiln-dried, 3 in 2,000.—*Quarterly Journal of Agriculture.*

Large Melon.—In August last, a melon of the netted species was cut in the garden of Sir Charles Halket, of Pitferran, which weighed 19 pounds. This is considered to be among the largest melons ever grown in Scotland. —*The Scotsman.*

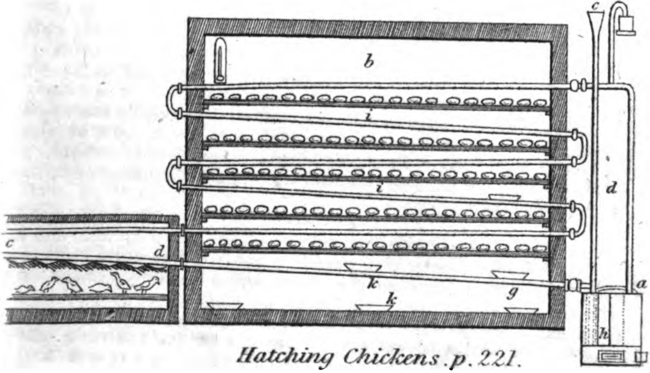
The Dahlia may be advantageously forced by potting the roots in February, and letting them remain in frames till June, when they will begin to flower, and may be turned out into the open border.—*Gard. Mag.*



New Refrigerator. p. 240.



Transplanting. p. 234.



Hatching Chickens. p. 221.

Hatching Chickens.—The Engraving represents a complete idea of the apparatus for hatching chickens without the help of hens, which is adopted in some poultry establishments; may be used for hatching silk-worms, and probably for germinating rare seeds or striking cuttings in a glass case, and will furnish young gardeners of ingenuity with ideas for unforeseen inventions and applications. The boiler of the apparatus is called a Calorifère (*calor*, heat, and *fero*, to bear,) and consists of a small boiler *a*, a box or building *b* for hatching the eggs, a cage or coop *c* for rearing the chickens, tubes *d* for circulating the hot water, a supply tube and funnel *e*, and a safety tube *f*. Supposing the water heated in the boiler, it will rise by its specific levity through the tube *a d*, move progressively through all the tubes, and return again to the boiler by the tube *g*, which is inserted in the lid like the other, but passes down to its lower part *h*. This circulatory movement once commenced, continues so long as the water is heated in the boiler; because the temperature is never equal throughout all parts of the apparatus. We may readily conceive that a perfect equality of temperature can never exist, on account of the continual loss of heat which escapes from the exterior of all the tubes. Meanwhile the temperature of the air enclosed in the box differs but little from that of the numerous tubes which traverse it; and as the bends of the tubes on the outside of the box afford but little surface to be cooled by the surrounding air, so the force of the circulation, which is always in the ratio of the difference between the temperatures of the waters passing out of the calorifère and re-entering it, does not become greatly diminished, even after having expended a large portion of its heat, on the outside of the box, in maintaining a gentle heat in the cage *c* adjoining to it.

When we would hatch chickens, we light the fire and raise the temperature till we obtain that degree of heat in the box which is fitted for incubation; we then place the eggs near to each other upon the shelves, with borders to them *i i*, which are fixed under each row of tubes. It is convenient not to cover on the first day, more than the twentieth part of the superficies of the shelves, and to add every day, for twenty days, an equal quantity of eggs; so that on the twenty-first day, the quantity of eggs first placed will be for the greater part hatched; so that we may obtain every day nearly the same number of chickens; but which may, nevertheless, be occasionally regulated by the particular season of the year.

In artificial incubation, to keep the air in the stove constantly humid, they place it in flat vessels, such as plates *k k*, filled with water.

When the chickens are hatched, they are removed from the stove, and carried to the cage *c*, where they are fed with millet, and nestle under a sheep's skin, with wool on it *l*, suspended over them. They also separate, by means of partitions in the cage, the chickens as they are hatched each day, in order to modify their nourishment agreeably to their age.

Artificial incubation is exceedingly useful in furnishing young fowls at those seasons when the hens will not sit, and, in some situations, to produce, or, as we may say indeed, to manufacture a great number of fowls in a small space.—*Gill's Tech. Repos.*

Fecundating the Seeds of Pinks with each other.—Many beautiful varieties of pinks have been obtained by artificial impregnation. The process is as follows:—Just before sunrise, open carefully the flower to be operated on, and abstract the anthers with small pincers. About eight or nine o'clock, place the ripe pollen upon the stigma of the flower, and repeat this two or three times in the course of the same day. If the act of impregnation has taken place, the flower will fade in twenty-four or thirty-six hours; but if not, the flower will remain in full beauty; in which case the attempt must be repeated. This should always be done in fine serene weather, and care should be taken to defend the impregnated flower from rain and mists. Plants raised from seeds which have been crossed, always bear the form of the mother, but take the colours of the male parent. Fewer seeds are produced by art than by nature alone; and the impregnated flowers are less visited by bees than others.—*Gard. Mag.*

An experimental Farm, as a school of practical husbandry for a part of central France, has been formed by the celebrated Abbé de Pradt. It is situated about a league from Avranches, on the great road from that city to Bort, in the department of Corrèze.—*For. Quart. Rev.*

Hoven Cattle.—As the distension is chiefly occasioned by carbonic acid gas, any substance which will combine with that gas will reduce it. Such a substance is readily found in ammonia (hartshorn,) a spoonful of which, infused in water, and forced down the animal's throat, completely removes the distension.—*From the French.*

Planting.—The Spaniards are infinitely more careful than the French, and other nations, in planting trees, and in taking care of them; for it rarely happens, when a Spaniard eats fruit in a wood or in the open country, that he does not set the stones or the pips; and thus in the whole of their country an infinite number of fruit-trees of all kinds are found; whereas, in the French quarters you meet with none.—*Labat.*

Culture of Turnips.—Until the beginning of the eighteenth century, this valuable root was cultivated among us only in gardens or other small spots for culinary purposes; but Lord Townshend, attending King George I. in one of his excursions to Germany, in the quality of Secretary of State, observed the turnips cultivated in open and extensive fields, as fodder for cattle, and spreading fertility over lands naturally barren; and, on his return to England, he brought over with him some of the seed, and strongly recommended the practice which he had witnessed to the adoption of his own tenants, who occupied a soil similar to that of Hanover. The experiment succeeded; the cultivation of field turnips gradually spread over the whole county of Norfolk; and, in the course of time, it has made its way into every other district of England. The reputation of the county as an agricultural district, dates from the vast improvements of heaths, wastes, sheep-walks and warrens, by enclosing and manuring, the fruit of the zealous exertions of Lord Townshend, and a few neighbouring land-owners, which were ere long happily imitated by others. Since these improvements were effected, rents have risen in that county from one or two shillings to fifteen or twenty shillings per acre; a country of sheep-walks and rabbit-warrens has been rendered highly productive; and, by dint of management, what was thus gained has been preserved and improved even to the present moment. Some of the finest corn crops in the world are now growing upon lands which, before the introduction of the turnip husbandry, produced a very scanty supply of grass for a few lean and half-starved rabbits. Mr. Colquhoun, in his "Statistical Researches," estimated the value of the turnip crop annually growing in this country at fourteen millions; but, when we further recollect that it enables the agriculturist to reclaim and cultivate land which, without its aid, would remain in a hope-less state of natural barrenness; that it leaves the land so clean and in such fine condition, as almost to ensure a good crop of barley and a kind plant of clover, and that this clover is found a most excellent preparative for wheat, it will appear that the subsequent advantages derived from a crop of turnips must infinitely exceed its estimated value as fodder for cattle. If we were, therefore, asked to point out the individual who, in modern times, has proved the greatest benefactor to the community, we should not hesitate to fix upon the ingenious nobleman, whom the wits and courtiers of his own day were pleased to laugh at as "Turnip Townshend." In something less than one hundred years, the agricultural practice which he introduced from Hanover has spread itself throughout this country, and now yields an annual return which probably exceeds the interest of our national debt.—*Sir Walter Scott—in Quarterly Rev.*

Moles and Mice.—To kill moles and mice:—Take ½ lb. maize, 1 oz. verdigrise, 3 oz. quicklime, 12 crawfish, ¼ oz. oil of aspic (lavender.) Pound and mix all well together into a paste, to which add a little river water; make up pills about the size of a nut, and lay them on the passages of the moles and mice.—*Gardener's Mag.*

The Weevil.—Mr. Carpenter has lately been favoured with several small living brown curculios or beetles, about a quarter of an inch in length, and covered all over with numerous small pits or depressions; together with some grains of barley, which were entirely divested of their farinaceous part by them when in their larva state, or that of weevils; as in their beetle or perfect state, they do not feed at all. Nothing remains of the grains of barley but merely their husks; and Mr. Carpenter informs us, that in the granary from whence he was furnished with them, they had totally destroyed above 1,000 sacks of grain! This is but one of the numerous instances which we may shortly expect to hear of their ravages, and one of the consequences necessarily arising from hoarding grain.—*Gill's Repos.*

Improved Syphon for Draining Quarries, &c.—Although theoretically speaking a syphon ought to raise water upwards of thirty feet, it is found that it will not continue long to act, if it have to raise it more than 12 or 14 feet. The reason of this is, that the air which all common water contains, begins to separate from that fluid as it rises under diminished pressure, through the short leg of the syphon, till at length the angle or convex head of the syphon is filled with air, and the current of water is interrupted. Mr. Cowan, (to whom the Society for Encouragement of Arts, London, awarded their Gold Vulcan Medal for the discovery,) places a box, with a valve opening to the atmosphere at the upper angle of the syphon, into which all the air separated from the water rises; and the application of a forcing-pump placed in the well in the quarry, once or twice a day for a few minutes, drives the air out of the box into the atmosphere. It is necessary that the forcing-pump be able to send water into the syphon faster than it can discharge it.—*Trans. Soc. Arts.*

Instructions for Breeding Pheasants.—Eggs being provided, put them under a hen that has kept the nest for three or four days; and if you set two or three hens on the same day, you will have the advantage of shifting the good eggs. At the end of ten or twelve days, thro
that are bad, and set the same hen or hens again, if settir

be plenty. The hens having sat their full time, such of the young pheasants as are already hatched, are put into a basket, with a piece of flannel, till the hen has done hatching. The brood now come, put under a frame, with a net over it, and a place for the hen, that she cannot get to the young pheasants, but that they may go to her; and feed them with boiled eggs, cut small, boiled milk and bread, alum curd, ants' eggs, a little of each sort, and often. After two or three days, they will be acquainted with the call of the hen that hatched them; let them have liberty to run upon the grass plat, or elsewhere, observing to shift them with the sun, and out of cold winds. They need not have their liberty in the morning, till the sun is up, and they must be shut in with the hen in good time in the evening. To guard against the distemper, let them be kept in a place where no poultry, pheasants, or turkeys have been kept before, such as the warm side of a field, orchard, pleasure-ground, or garden. When they are old enough, those that are to be turned out wild, ought to be taught to perch. This is done by tying a string to the hen's leg, and obliging her to sit in the tree all night. Be sure you put her in the tree before sunset; and if she fall down, you must persevere in putting her up again, till she is contented with her situation. Then the young birds will follow the hen, and perch with her. This being done, and the country now covered with corn, fruits, shrubs, &c. they will shift for themselves. When ants' eggs and insects are scarce, artificial ants' eggs may be given, composed of flour beaten up with an egg and shell together, and the pellets rubbed between the fingers to a proper size. After the first three weeks, in a scarcity of ants' eggs, a few maggots may be given, procured from a good liver tied up, the maggots, when ready, dropping into a pan or box of bran, to be given sparingly, and not considered as common food.—*Farrier and Naturalist.*

Effect of Pear Trees in Landscape.—Mr. Gorrie, gardener at Annat, proposes to make use of several varieties of the pear tree, as calculated, by their picturesque forms, the beauty of their blossoms and fruit, to form good additions in landscape gardening. The varieties which he recommends are, the Benvie pear, the golden knap, and the Elcho pear, for conical forms; and the busked lady, the pow meg, and the pear Duncan for spreading forms. The author mentions, in reference to one of these provincial pears, that the originaal tree of the Benvie pear, is still standing in the Carse of Gowrie, and is much decayed; the young trees, however, which are cultivated in almost every orchard, show no marks of approaching dissolution.—*Gardener's Mag.*

To Destroy Crows.—Those who wish to get rid of crows, and who have spirit to enforce their wishes, may do it with less trouble during the hatching month than in any other period of the year. After the female begins to sit, if they are frighted away only a day and night or two from the rookeries, the eggs, to which they will again betake themselves, will not produce; and thus the young brood will be checked, and the dam weakened by sitting on her rotten eggs an indefinite time.—*Carse of Gowrie Report.*

Leaves and Bark of Trees as Fodder for Cattle.—Near Seldun, the leaves of the nut and the elm are used in a particular manner. Gathered when in their prime, they are ground into powder. In this state they are given to swine, mixed with their customary drink, in the winter; and it is even said that this food fattened them as well as barley-meal. In the Oberland, the bark of the young oak, peeled off in the spring, dried and ground, is found to be equally healthy and nutritive for all kinds of cattle. We mention these things, because a knowledge of them may be useful in the mountainous districts of our own country.—*For. Rev.*

Wild Mint.—A farmer in the Hebrides some time ago discovered that a few stalks of wild mint scattered up and down among his stacks completely preserved them from the ravages of mice. He also tried the experiment with his cheeses and other articles kept in store, and found it equally successful.—*Yorkshire Gazette.*

Small white Slugs in gardens are more injurious than the larger variety, because their diminutive size escapes the gardener's eye. A good way to keep them under is to make small holes, about an inch deep, and about the diameter of the little finger, round the plants which they infest. Into these holes the slugs will retreat during the day, and they may be killed there by dropping in a little salt, quicklime in powder, or by strong lime and water.—*Gardener's Mag.*

A new Journal of Agriculture has been published in Florence, which reckoned, on the appearance of its second number, more than 600 subscribers in Tuscany alone, a fact not only highly honourable to the editors, but also to the country at large. On this subject it is not unappropriate to remark, that the printing-presses of Florence have been doubled within the last six years.—*For. Quart. Rev.*

Kamtschatka.—The Russian government has sent a skilful gardener to Kamtschatka, to instruct the inhabitants in the art of cultivating the earth to the greatest advantage. The climate of Kamtschatka is not so severe as is generally supposed; and many vegetable productions may be raised there, with proper management.—*Lit. Gaz.*

Potato Mortar.—M. Cadet-de-Vaux found mortar of lime and sand, and also that made from clay, greatly improved in durability, by mixing boiled potatoes with it.—*From the French.*

Management of Town Gardens throughout the year.—January. In this month but little can be done. The walks should be swept, and the beds kept clean, so that all may have as neat an appearance as possible.

February. Any rough work may be done in this month, but turf and gravel should not be laid till April. The turf of a London garden requires to be renewed every year. If frames or hand-glasses be admitted, dahlias and other fleshy-rooted plants may be potted, and sheltered from the cold till March or April.

March. In the beginning of this month see that the ground be properly trenched, and prepared for planting. A good stock of annual seeds should be procured, and, about the 20th, sown in patches on ground which has been carefully dug and raked. If there be hand-glasses, &c., the tenderer sorts may be introduced. Mignonette, Virginian stock, Lobel's catchfly, poppy, larkspur, purple œnothera, snapdragon, lupines, and sweet peas, are good sorts for a town garden, among the hardy annuals; marvel of Peru, Love-lies-bleeding, prince's feather, and red zinnia among the more tender.

April. Where any trees or shrubs are wanted, this is the season of planting in London. Perennial flower roots may now be planted, such as St. John's wort, fraxinella, perennial sunflower, and dahlias, in the open ground. Attend to weeding and watering the seeds sown last month. Turf should now be laid, and gravel walks made, picked, or rolled, as they require.

May. Keep all things perfectly clean. Attend to your annuals, which will now require thinning and regular watering, and more seed may be sown for late blooming. Plant geraniums and all other ornamental plants, of which great choice may be had at Covent Garden market. A water engine should be used, and will be found truly beneficial in washing the soot off the plants.

June. The same directions apply to this month also. Watch and carefully pick off the plants all grubs and insects of every description, and destroy worms, snails, and slugs, by copious watering with lime water.

To July, August, and September, the directions for May will equally apply.

October. The frost and soot now attack with deadly force every plant unfortunate enough to find itself in London. Cut off the leaves and stems as they become disfigured or perish. Take up the roots of dahlias, marvels of Peru, &c., and preserve them in dry sand.

November. Trench the beds two spits deep, and leave the earth in as rough a state as possible, to be pulverised and sweetened by the action of the frost. This is essentially requisite, for the soot will otherwise render the earth sour, and of a fetid smell.

December. Nothing to be done, unless it be contemplating and laying plans for your spring work.—*Correspond. Gard. Mag.*

Horse-Radish.—After horse-radish has borne seed once or twice, its root becomes hard, brown on the outside, not juicy when it is scraped, and eats more like little chips than like a garden vegetable; so that at taverns and eating-houses, there frequently seems to be a rivalship on the point of toughness between the horse-radish and the beefsteak; and it would be well if this inconvenient rivalship never discovered itself any where else.—*Cobbett's Gardener.*

Laying out Gardens.—In the work of laying-out, great care ought to be taken with regard to straightness and distances, and particularly as to the squareness of every part. To make lines perpendicular, and perfectly so, is, indeed, no difficult matter when one knows how to do it; but one must know how to do it, before one can do it at all. If the gardener understand this much of geometry, he will do it without any difficulty; but if he only pretend to understand the matter, and begin to walk backward and forward, stretching out lines and cocking his eye, make no bones with him; send for a bricklayer, and see the stumps driven into the ground yourself. The four outside lines being laid down with perfect truth, it must be a bungling fellow indeed that cannot do the rest; but if they be only a little askew, you have a botch in your eye for the rest of your life, and a botch of your own making too. Gardeners seldom want for confidence in their own abilities; but this affair of raising perpendiculars upon a given line is a thing settled in a moment: you have nothing to do but to say to the gardener, "Come, let us see how you do it." He has but one way in which he can do it; and, if he do not immediately begin to work in that way, pack him off to get a bricklayer, even a botch in which trade will perform the work to the truth of a hair.—*Ibid.*

Brussels Sprouts.—It is, most likely, owing to negligence that we hardly ever see such a thing as real Brussels sprouts in England; and it is said that it is pretty nearly the same in France, the proper care being taken nowhere, apparently, but in the neighbourhood of Brussels.—*Ibid.*

Uses of the Sunflower.—All kinds of poultry fatten on the seeds; and the leaves, green or dried, are eaten by most ruminating animals as grass or hay. In Portugal, bread, and likewise a kind of groats, are made of the seeds; in some parts of America they roast the seeds, and use them as coffee. The whole plant exudes a thin odorous resin. They might be judiciously planted in front of the apiary among borage, which, of all other plants, is the most essential to bees' culture. Any one who has seen them ignorantly planted on vine or other fruit tree borders (the sunflower leaves perspire more matter than any other plant known to exist) will conclude that they like a strong rich soil.

A very delicate oil, much used in Russian cookery, is expressed from the seeds of the sunflower, and is prepared by enclosing them in bags, and steeping them in warm water, after which the oil is expressed; this is actually as sweet as butter.

Potatoes.—Mr. Tindall observed that, after a favourable winter, potatoes which had been left in the soil from defective gathering, generally made their appearance about the time that potatoes are planted in spring. He therefore tried planting in October, protecting with litter during winter, and sheltering the tops with branches of evergreens, stuck in on each side of the rows, as in sticking peas, in spring. He also planted some of the same kind of potato, in the same soil and situation, in February, in order to compare the difference. Those planted in October made their appearance about the 20th of March; those in February, about the beginning of April. At this time the ground was forked about the October planted ones, as it had been much soddened during winter by the snow and rain; it was also watered at this time. The young potatoes might be discerned at the roots, as large as the largest Marrowfat peas; while at the February planted sets, the fruitful runners were only beginning to shoot forth. On the 4th of June, good potatoes were taken from the October planted ones, such as could not be got from the February ones at three weeks afterwards. Cut sets are apt to rot in winter, but this is easily remedied by planting small potatoes whole. The above mode Mr. Tindall has successfully practised since 1820, it therefore deserves imitation in every part of the island, where a covering of litter will keep out the frost.

Mr. West quotes, from a letter in *Time's Telescope*, to show that the only way to prevent the curl, is to renew occasionally from seed. The long kidney potato, he states, flourishes best in a strong soil; the large yam, in a stiff loam; the American early, in a light rich mould; and the Irish round, in fresh newly turned up land. The best manure for the flavour of the potato, is the decomposed leaves of beech, sycamore, and willow. Well-screened coal-ashes, with the ashes of wood and weeds, and a mixture of loose horse litter, will render a strong, stiff, clayey soil, fit for producing abundant crops. He cuts his sets about the middle of February, and places them in a box of coal-ashes and sand. When they have shot an inch in length, he plants them in drills three inches deep, one foot between set and set, and three feet between the drills.—*Trans. Hort. Soc. Durham, &c.*

Abundance of Potatoes in Ireland.—In the spring of 1821, potatoes in Ireland were purchased at the rate of 1s. 4d. for twenty-one pounds; the same quantity might have been purchased this year for one halfpenny. A similar overflow of the staple of popular subsistence is without a parallel.—*Quart. Jour. of Agriculture.*

Culture of the Potato. By Mr. C. Hale Jessop, Nurseryman Cheltenham.—Double-dig the ground, and, without manuring, plant the potatoes, whole, two feet apart each way. When the plants rise, I hoe and draw the earth up to them, moulding entirely round each plant, by which mode all have room to swell and bring their tubers to perfection. The soil is not much exhausted by this practice, and the potatoes are easily got at so as to mould them up, even in their last stage of growth. I next pick off the blossoms, a practice which has been proved by Mr. Knight to add to the produce one ton per acre. I allow potatoes to be planted wherever I make plantations of trees for timber, as the spaces between the trees can be profitably used without detriment to them, and from the way the potatoes are moulded round, whatever rain falls in a dry summer, is quickly conveyed to the roots of the newly planted trees, as it runs down the hill of earth containing the potatoes.—*Gard. Mag.*

Method of Burning Lime without Kilns.—The practice of lime-burners in Wales was, formerly, to burn lime in broad shallow kilns, but in some parts they now manufacture that article without any kiln at all. They place the limestone in large bodies, which are called coaks, the stones not being broken small as in the ordinary method, and calcine these heaps in the way used for preparing charcoal. To prevent the flame bursting out at the top and sides of these heaps, turf and earth are placed against them, and the aperture partially closed. The heat is regulated and transfused through the whole mass, so that, notwithstanding the increased size of the stones, the whole becomes thoroughly calcined. This practice has long prevailed in Yorkshire and Shropshire, and is known in Scotland.—*New Monthly Mag.*

Indian Corn.—Mr. Cobbett has made an attempt to introduce in England the cultivation of Indian corn, for which the farmers have hitherto considered the climate too cold and damp. He had a field of it at his farm, Barn Elm, near the Suspension Bridge leading to Hammersmith. It was a dwarf kind, more hardy and productive than the common Indian corn grown in America. Notwithstanding the bad season, the greater part of this crop has been successfully harvested, yielding, at the least, 95 bushels to the acre.

Bees'-houses.—The best situation for houses is a little to the west of the south; for the sun shining into the mouth of the hive too early, calls the bees abroad before the cold steam is exhaled from the flowers, and the vernal juice turned into honey: but in this situation the sun will reach the front of your bee-house about nine o'clock. The front of the house should lean a little inwards, that the mouth of the hive may fit close to the mouth made in the boards, which should be three inches long in summer, and one in winter, and about one fourth of an inch high, the better to keep out cold and the bevering moths, which you may often see, at the latter end of August (when the working of the bees begins to decline,) standing at the mouth of the hive, bevering their wings as if just flying in among the bees: they there lay their eggs, and with the wind of their wings fan them within the hive; and the warmth of the bees hatches them, to their own ruin. In October every stock should be well examined, and all the maggots brushed out, to prevent danger; for the grub or maggot forms a chrysalis, with a covering so strong, that the bees cannot displace them; and in the spring they creep out of their little sepulchres, and spin a thin web before them, as they march up into the hive among the combs; and the bees endeavouring to dislodge them, are entangled in the web, and there die; and thus for want of a little trouble, many stocks are destroyed. To cleanse the hive of these maggots, it must be turned up, and the dust and vermin picked out, and then gently set down in its place. If your bees are well, and in a condition to stand the winter, and have a mother with them, they will sting, otherwise not unless you hurt them; however, a a yard and a half of Scotch gauze sewed round the brim of your hat, and then tied round the waist, having holes for your arms, will completely secure your face. The hive should be also brushed on the outside very clean, and washed all over with a sponge dipped in brine made with clean salt; a small quantity of lime and hair, made fine, should be put round the bottom, and the hives be covered with hay or haybands; for straw may contain some corn which may attract the mice, who may gnaw the hives.—*Gill's Repos.*

Management of Bees.—We have received from Mr. S. W., of Lancaster, an account of an easy and ingenious mode of managing bees, and taking their honey without killing them. A common straw hive is used in the first place, prepared by having two doorways instead of one: the first, in the front of the hive, to serve as the common entrance; the second, at the side or back thereof, which must be stopped with moss or soft paper till it is wanted. When the hive is filled with comb, have a box 1 foot square inside, made of stout yellow deal, having a glazed window and outside shutter fitted thereto, to see the bees at work; this, having a doorway of the same size as that of the closed one of the hive, is placed close thereto, the moss or paper stopping being first removed. The bees will soon begin to work, and, if a good season, fill the box also, at which time it may be taken away. In doing this, "run with it to some out-house," and allow the bees it contains to return home. The queen seldom goes into the box, but if, by chance, she should be there, the box must be carried back to the hive, and she and her companions drummed out, by gently tapping the box. In doing this, a bee-dress is necessary.—*Gard. Mag.*

A Strawberry was gathered, on the 20th of June, from the garden of Mr. Norris, Brentford End, which measured 13½ inches in circumference, and weighed upwards of 3 ounces.—*Morning Herald.*

Mode of preventing Stacks from taking Fire, where they have been too quickly carted.—In a stack twelve yards long and six wide, pull or bore eight holes about the size of your arm, beginning with your hand, and finishing with an iron rod, having a strong gag at the end, and an auger handle; pull them in a triangular manner, beginning the first row close to the thatch, about a yard from the end, and the second row between the first and the ground.—*Edin. Adv.*

Hedge-rows.—The kinds of trees best fitted for hedge-rows, are the oak, elm, particularly the narrow-leaved, sycamore, black Italian poplar, birch, alder, larch, &c. In high or exposed situations, the hardier sorts should be chosen, such as sycamore, birch, larch, Scotch pines, &c. planting pretty thick at first is recommended, say from 10 to 15 yards asunder; and, when grown up, let them be thinned out if necessary. In lower situated grounds, from 20 to 30 yards asunder is a good distance; in small enclosures, surrounded by larger, that are well planted, fewer still are wanted; observing to plant thickest on the east and north sides of the fields, as the winds from these points are generally keenest and most destructive to vegetation. The lands exposed to the sea, in all points, should be best protected. The black Italian poplar is an excellent sort for hedge-rows, as being much quicker of growth than the others, and a wood coming very generally into repute. A few Scotch pines, dotted in in the hedge-rows, among the deciduous sorts, would have a pleasing effect to the eye, and would answer the purpose of shelter equally with the other kinds. In those counties where coal is scarce, the loppings of the hedge-row trees would be found a valuable consideration to the tenant as fuel. With regard to the expense of planting, it is so trifling a consideration, compared to the advantages this plan holds forth, that it is not worth taking into account; two or three men would, in a very short time, plant a large estate.—*Gardener's Mag.*

Exhausting and Ameliorating Crops.—The causes which give to particular crops the character of being exhausting or ameliorating to the soil, depend either on their being allowed to mature their seed, on their particular mode of culture which admits of the tillage of the ground during their growth, and on their yielding manure. Wheat, barley, oats, and rye, are consequently exhausting. Turnips, carrots, parsnips, beet, cabbage, and rape, if cultivated for their leaves only, are ameliorating. In the case of the turnip, the mode of cultivation, and the quantity and quality of manure it produces, combine with the other circumstance of its not being allowed to mature its seeds, to render it one of the most ameliorating of all crops; whereas if allowed to run to seed, it becomes one of the most exhausting. Potatoes and beans, although allowed to mature their seeds, are considered among the ameliorating crops, because they admit of being cultivated at wide intervals, and permit the ground to be tilled completely during their growth; they also yield manure. Clovers, if used for herbage, or cut early for food, are ameliorating. If cultivated for their seeds, exhausting.—*Quar. Jour. of Agriculture.*

Vegetables.—Watering gives vegetables long exposed a fresher colour and a more attractive appearance; but repeated waterings are highly pernicious, as they neutralise the natural juices of some, render others bitter, and make all others vapid or disagreeable.—*Scotsman.*

Enriching Properties of Water.—Water, even in the purest state in which it can be found, is an enricher. Spring water uniformly produces the earliest bite, and calcareous springs the best grass. Water in which flax has been steeped, and which the farmer is often puzzled to get rid of, without polluting the streams in his neighbourhood, forms a superior substance for irrigating; but, in short, the more abundantly water is impregnated, either from running through a track of rich soil, or from receiving the refuse of towns and manufactories, or even from being exposed to mixture with putrid substances (and so becoming putrid itself,) in ponds or in reservoirs, so much the more are its effects beneficial; and it has been frequently remarked, that no watering is so enriching as that which is given in summer floods.—*Trans. of the Highland Society.*

Asparagus.—A correspondent of the *Gardener's Magazine* is of opinion that the cultivation of asparagus may be improved by irrigation, although a dry, sloping situation is generally recommended. He had three beds 60 yards long, four rows in each bed, which had been laid down about three years previous with seed. From the 1st of October 1827 to the middle of February last, the beds were, except about 4 rods, completely flooded to the depth of from 6 to 12 inches. When the water went off in the latter end of February, he ordered the beds to be forked over, with the intention of drying the ground, and getting the roots into health; but the shoots were appearing on every part, and on the 4th of March he cut 400 of good quality, and to the end of April continued to cut 100 daily.

The Swedish Turnip.—The Swedish turnip is more nutritious and hardy than any of the common kinds of turnip, and is more liked by all animals. It remains sound and full of juice in spring, and even after it has put forth its flowering stems. It does not suffer, in the like degree, from those wounds upon its surface, to which all turnips are subject, from birds and other wild animals. This root is therefore a valuable and secure resource in the latter part of spring, when the common turnips may have decayed, and when the grass is not yet in sufficient abundance for the feeding stock. It is given to milch cows, and does not taint milk in the same degree as the common turnip. It is excellently well adapted, in its raw state, to the feeding of hogs. In the same state it is relished by horses, and furnishes a wholesome and succulent food, to be used along with the drier substances which the working cattle consume in winter.—*Quart. Jour. of Agriculture.*

Ornamental Gardening.—One great error into which we have fallen is, that nearly all our gardens, such as they are, are alike. The small walled in gardens of the villas in the neighbourhood of London; the distribution of shrubs and flower-beds of the London squares; the college gardens of Oxford and Cambridge (to which latter places our style is less objectionable than elsewhere, being, perhaps it may be said, conducive to study, contemplation, and, repose;) the pleasure-gardens of our country residences, both great and small, from those of Buckingham Palace and St. James's Park to the humblest parsonage, are on precisely the same model. They may be said, one and all of them, to be formed on a plan of which the gardens of the Petit Trianon of Versailles, is an admirable caricature; indeed, no better method of properly appreciating and understanding our style, as well as of learning how a too strict adherence to its principles rapidly exposes its errors, than a visit to some of the imitations of it on the Continent, of which the gardens of Malmaison and the Trianon will afford happy examples.—*Gardener's Mag.*

Consequences of a Warm Spring.—If in one respect a warm spring is desirable, in consequence of the grass crop affording the cattle early nourishment, yet, in others, considerable disadvantages are connected with it; the worm creeps in on vegetables, and into orchards, consuming the blossoms, young cabbages, and even the leaves of the trees.—*Quart. Journ. of Agriculture.*

Training the Vine on Wires downwards. A correspondent of the *Gardener's Magazine* has by this mode, from one house, containing 17 rafters, produced upwards of 480 lbs. of superior fruit, which he states to be more than double the quantity he could ever procure from the old system of training to the glass.

White Hoofs in Horses.—Even in a wet soil and climate, white hoofs are more brittle and more liable to accident and lameness than black ones; and, in the stony and more arid soils and climates, white hoofs do not stand nearly so well, and are much more liable to break and to contract than those of a dark colour; and, in point of fact, horses having white legs and feet do not bring so much money as those of precisely the same description which have them not.—*Quart. Journ. of Agriculture.*

Dung without Straw.—A writer in the *Journal des Connaissances usuelles* says he has adopted a system of culture, by which the whole of the straw produced is eaten by cattle, and no other litter is used but dry sand. The same thing, we believe, has been practised in some parts of Norfolk.—*Gardener's Magazine.*

Manure.—The importance of saving the urine of cattle, for the purpose of manure, has justly been a favourite theme amongst the greatest agriculturists, but in no way can it be turned to such advantage, as by fitting earth to form a top-dressing for grass. Even when applied alone, and without any admixture, it improves grass to a high degree; and with little trouble, and at little expense, every farmer has the means of keeping up the fertility of his grass lands, without robbing his other crops.

The refuse of soap, or soaper's ashes, and even soap-suds, or soapy water, may be used to good account, as top dressing, as may lime rubbish of any kind, and soot, although it be some time after the application of the latter before cattle will relish the grass; but, in short, every kind of earth and manure, applied to the surface of grass land, is productive of beneficial effects.—*Trans. of the Highland Society.*

Patent Receipt for Manure.—Mr. Bernard Petre has obtained from the Austrian government, a patent for five years, for a method of collecting manure in a way "to prevent the volatilization of gas, and to improve it to such a degree as to render it of six times the efficacy of other ordinary dung-heaps." The following is Petre's Patent Recipe. On an even and dry spot in the farm-yard, lay a first bed fifteen to twenty inches deep, consisting of litter, straw, or leaves but little charged with excrement; with this may be mixed marl, bones and all sorts of substances susceptible of putrid fermentation; fold horned cattle or sheep on the bed so formed, for several successive nights, then spread over it to the height of one-fourth of an inch of peat charged with sulphur, or ash lye, or the one-eighth of an inch of mere cinders; then cover the whole with good mould or marl. On this bed form a second of the same depth as the first, of the dung of different animals; then lay on wood ashes, to the thickness of one-eighth of an inch; or a quarter of an inch of peat, charged with sulphur, or of soap lye; or half an inch of cinders of potash, or merely common salt. As the heap gets dry, let it from time to time be watered. Lastly cover it again with a three inch bed of slime or mud or marly soil, and finish with a bed of wood cinders, &c. as before. The simple cinders are the best for the purpose. When the mass is in high fermentation, and smokes, let it receive another covering of soil, of the depth of three or four inches. The heap should be bored occasionally, to be assured that the fermentation proceeds duly, to replace the soil when it has sunk, to moderate with water the fermentation where it is too violent, and to give access to the air when it is slow. When the fermentation has ceased, the heap should be thoroughly watered in order to prevent the ulterior effects of the decomposition, and the volatilization of the gas. Finally, break up the heap, mix the elements well together, divide them into smaller quadrangular vertical-sided heaps to be left to the action of the air. As these dry, rake them or break them up, and scatter them in the form of dust at seed time.

Manures.—The stimulating powers of excrementitious manures arise from the salts of ammonia they contain. Sir H. Davy found vegetation assisted by solutions of muriate of ammonia (Sal ammoniac,) carbonate of ammonia (Volatile salt,) and acetate of ammonia.. Night-soil, one of the most beneficial of manures, surpasses all others in the abundance of its ammoniacal constituents in the proportion of 3 to 1. It may be observed that the nearer any animal approaches to man in the nature of its food, the more fertilising is the manure it affords.—*Gardener's Mag.*

Manure.—It is a common practice to burn couch-grass, docks, gorse, and other vegetables which are very retentive of life, or slow in decay; a more uneconomical, unscientific method of reducing them to a state beneficial to the land of which they were the refuse, cannot be devised. In breaking up heaths, such exuviæ are very abundant; but, in all cases, if the weeds, leaves, &c., were conveyed to a hole or pit, and with every single horse-load, and with barrow-loads in proportion, a bushel of salt and half a bushel of lime were incorporated, it would, in a few months, form a mass of decayed compost of the most fertilising quality.—*Gard. Mag.*

Manuring Forest Trees.—No one thinks of planting fruit trees, even in a garden, without manure, and no good farmer attempts to raise a fence upon ordinary land, without manuring it at the time he plants the layer. Fences so raised will make greater progress in one year, than they will in three without manure; and there is no reason why the same stimulus should not prove equally beneficial when applied to forest trees.—*Gill's Repos.*

Pruning.—The shoots from the stools of forest trees, it is well remarked by Mr. Monteith, may either become crooked branches of little use but as fuel, or beautiful and straight timber trees, according as the old tree may be cut over close by the surface, or one foot above it. This important fact ought to be familiar to every forester, and constantly kept in mind by the gardener in pruning fruit trees.—*Gardener's Mag.*

Method of Pruning—Canker in Trees.—In pruning, cut off from every shoot two-thirds of its length; the wood forms buds for the following year; as the tree gets crowded, or out of shape, take off a whole bough or branch with a saw. To cure cankering, take the trees up carefully, examine and prune both root and branch, and plant them again in similar fresh soil.

The precaution of flagging, paving, or gravelling, lest the roots get into bad soil and canker, is useless, since trees will never go into bad soil, if they have plenty of good to go into, any more than cattle will go into bad pasture, if they have plenty of a better quality.

The cause of the canker in trees is very similar to the cause of the scurvy in man; it is either a defect of the blood or blood-vessels; in trees, it is generally the defect of the latter, as it is never the ascending sap which causes it, but always the descending sap which is obstructed in its passage to the root. A wet autumn causes a superabundance of sap in the leaves, which being forced to return in an undigested state, the pores are too contracted to admit it in a regular way, and it forces new channels in the bark; the first frosty night converts such streams into ice, and they become what Mr. Forsyth calls "small dots as if made with the point of a pin." Midsummer pruning is a good preventive.

If a tree throws out one or two very luxuriant shoots, while the others are quite weakly; it may be concluded, that it has thrown out one or two extraordinary luxuriant roots the preceding season; the rambler may be sometimes found by digging under the tree; if not, the tree should be dug up, and it will be surely found.—*Gardener's Mag.*

Transplanting Trees. (See the engraving.) Mr. Maine in his review of Sir Henry Steuart's "Planter's Guide," (in the *Gardener's Magazine*) describes the following process as practised by him, in the year 1799, at Chalfont, Berks, where upwards of 31 acres of meadow land had been added to the park, which "particularly called for the immediate effect of wood to mark the property, extend the scenery, and give a unisemblance to the whole."

We had a low oaken sledge, 5 feet by 4, running on low block wheels, before, and resting on smooth iron slides behind. On this, after the tree was pulled down, the root was rolled like a wheel, by involving chains fixed as low as possible on the opposite side, by a horse or two, driven steadily. When such weighty trees were drawn to the hole where they were intended to stand, and rolled off the sledge into one side of it, the tree was raised by the horses with the utmost ease, by means of two poles, 20 feet long, crossed, and made fast together about 2 feet below their upper ends. Over this crossing, the rope by which the tree was pulled down (being still attached) was passed; the poles were then elevated across the line of draught (which was directly from the butt of the tree;) the horses were hooked to the end of the rope, and gently moved forward; and thus, from the elevated direction of the rope from the tree to the crossing of the resisting poles, brought the tree upright. *(See the engraving.)* In raising a tree in this easy way, a little judgment is necessary in keeping the poles 2 or 3 yards apart at bottom, that they may lean rather towards the tree till they receive the full strain of the draught, and that they may be at such a distance behind the horse as not to drop on him in their fall when the tree is up. All the largest trees (except those of ash and elm, which stood in the old hedgerows) which now stand in the meadow ground laid to the park, viz. spruce firs, alders, limes, elm, and beech, were chiefly planted in this way.

Rule of the Quality of Saltpetre.—The goodness of the saltpetre is measured by the angle at which light is refracted in passing through it. As the angle is less, the quality is better. This angle varies very considerably. An angle of 5° is called par, and the variations from it are made up by increasing or diminishing, not the price, but the quantity; for every degree by which its angle of refraction exceeds 5, 1 per cent. in weight is allowed, and *è converso.* The inferior sort contains common salt; it is tested at Apothecaries' Hall, and the several refractions denoting the quality are marked upon the bags.—*Quart. Jour. of Agriculture.*

The paper from which this extract is made recommends the use of salt-petre as manure, and gives several instances in which it had been so applied with great and repeated success, especially in the cultivation of grass.

Salt as a Manure.—A general rule is, never to sow it with the seed. For potatoes, onions, carrots, and parsnips, from 10 to 12 cwt. per acre; laid on not nearer than one month *before* seed time; and for garden-ground in general, 14 or 16 cwt. per acre, to be laid on early in spring. Composts, 1 cwt. per load. Its principal use, as assisting vegetation, is, its property of absorbing moisture from the air, and retaining it in the soil; and also its use in destroying weeds and vermin.—*Gard. Mag.*

Pears may be grafted on Stocks of the Mountain Ash and the Service Tree; both of which will grow and thrive where pear-tree stocks would not. I have also seen apples grafted on quince stocks, and planted in a soil so wet that an apple could not live; but they are doing very well, and making exceedingly fine shoots.—*Corresp. Gard. Mag.*

To keep the Common Blue Plum.—Glass vessels, or small wooden casks made air and water tight, are used for this purpose. When ripe, the fruit are gathered with great care (the hands being covered with soft gloves, and only the stalks touched, in order to preserve the bloom,) and laid one by one in the vessel till it is full. The vessels are then closely covered by wet bladders so as to completely exclude the air, and buried in the ground, or suspended in cisterns, wells, or cellars, out of the reach of frost. In February or March they may be used, and, if the above precautions have been taken, will be found excellent. The vessels should be small-sized; as the fruit remain good but a very short time after being opened.—*Gard. Mag.*

To keep Pears.—In the north of Germany they keep winter pears packed in wooden boxes or casks, interlayered with clean sweet straw, closely shut down, and placed in a room out of the reach of frost. The fruit require examination every month, that those beginning to speck may be used or taken out.—*Gardener's Magazine.*

USEFUL ARTS.

Machine for Washing Potatoes, by John Lawson, Jun. of Elgin. This operation is generally performed by an open cylinder turned round in a cistern of water. Mr. Lawson employs a wooden or iron trough with a movable bottom above the other one, composed of spars three quarters of an inch apart. This bottom being in its place, the potatoes are laid over it, water admitted at one end by a cock, the potatoes moved backwards and forwards by a wooden hoe till they are clean, and the dirty water then let off by another cock at the opposite end. The use of the sparred bottom is to allow the sand and earth to fall through them, and be run off with the dirty water. The rest is obvious.—*Brit. Farm. Mag.*

Rearing Silk Worms.—A correspondent of *Gill's Repository*, says, I have, during the present year, reared several hundred worms upon a species of lettuce obtained from abroad, which have gone through their successive changes, and spun silk of a quality and in quantity equal to that obtained from a corresponding number, fed entirely on the mulberry-leaf. Indeed, in a few instances, the cocoons were much larger, and the silk double the quantity, in these fed on this lettuce, but on an average there was at least an equality of produce. I have also had a second generation of these worms, spontaneously hatched this autumn, which have, throughout their larva state, solely subsisted on this lettuce diet, have attained maturity, and in produce yielded similar results. The superiority of this description of lettuce, over those indigenous to the soil of this country, consists in being less succulent, producing very large leaves, less stalk, and consequently affording less opium (which may be injurious to them) than the common lettuce; the worms, too, invariably give it the preference. In a rich soil, placed at a proper distance from each other, they attain an immense size, and are, therefore, more economical.

Field's Colourless Lac Varnish.—Six ounces of shell-lac, coarsely pounded, are to be dissolved by gentle heat in a pint of spirits of wine. To this is to be added a bleaching liquor, made by dissolving purified carbonate of potash in water, and then impregnating it with chlorine gas, till the silica precipitates, and the solution becomes slightly coloured. Of the above bleaching liquor add one or two ounces to the spirituous solution of lac, and stir the whole well together; effervescence takes place, and when this ceases add more of the bleaching liquor, and thus proceed till the colour of the mixture has become pale. A second bleaching liquid is now to be added, made by diluting muriatic acid with thrice its bulk of water, and dropping into it pulverized red lead, till the last added portions do not become white. Of this acid bleaching liquor small quantities at a time are to be added to the half bleached lac solution, allowing the effervescence which takes place on each addition to cease before a fresh portion is poured in. This is to be continued till the lac, now white, separates from the liquor. The supernatant fluid is now to be poured away, and the lac is to be well washed in repeated waters, and finally wrung as dry as possible in a cloth. The lac obtained in the foregoing process is to be dissolved in a pint of alcohol, more or less, according to the required strength of the varnish; and after standing for some time in a gentle heat, the clear liquor, which is the varnish, is to be poured off from the sediment. White lac varnish as above prepared, and used in a temperature of not less than 60°, dries in a few minutes, and is not afterwards liable to chill or bloom; it is therefore applicable to drawings and prints which have been sized; and may be safely and advantageously used upon oil-paintings which have been painted a sufficient time, as it bears out colour with the purest effect. This quality prevents its obscuring gilding, and renders it a valuable leather varnish to the bookbinder, to whose use it has already been applied with happy effect, as it does not yield to the warmth of the hand, and resists damps, which subjects bindings to mildew.

Another process is as follows:—Dissolve five ounces of shell lac in a quart of rectified spirit of wine; boil for a few minutes with ten ounces of well burnt and recently-heated animal charcoal, when a small quantity of the solution should be drawn off, and filtered; if not colourless, a little more charcoal must be added. When all colour is removed, press the liquor through silk, as linen absorbs more varnish, and afterwards filter it through fine blotting-paper. In cases where the wax contained in gum lac would be objectionable, filter cold; if the wax be not injurious, filter while hot. —*Gill's Repos.*

St. Helena Silk.—A specimen of the raw silk, produced at the island of St. Helena, has arrived in England. It is the first perfect one, and is considered to be of a very fine quality. It is entirely free from any disagreeable odour, which speaks much in its favour. In August, 1827, the number of worms in progress was 218,000, which were in a very healthy condition, and expected to spin in the course of a few days. The mulberry trees thrive remarkably well, and have a very luxuriant appearance. —*Jameson's Journ.*

Telegraphs.—The system of telegraphs has arrived at such perfection in the presidency of Bombay, that a communication may be made through a line of 500 miles in eight minutes.—*Weekly Rev.*

Mahogany.—The largest and finest log of mahogany ever imported into this country has been recently sold by auction at the docks in Liverpool. It was purchased for 378*l.*, and afterwards sold for 525*l.*, and if it open well, it is supposed to be worth 1,000*l.* If sawed into veneers, it is computed that the cost of labour in the process will be 750*l.* The weight on the king's beam is six tons thirteen hundred weight.

Rupert's Drops.—These drops are made by letting melted glass fall into water; as their surface is but small, and it is of a spherical form, it is sufficiently strong to resist the expansion of the internal portions and the pressure of the external air, caused by the vacuum which is formed within; but if the fine drawn out point of the drop is broken off, the resistance ceases, and the glass drop, although very thick, is reduced into powder. In some glass-houses the workmen show glasses which have been cooled in the open air; on these they let leaden bullets fall without breaking them. They afterwards desire you to let a few grains of sand fall on them; by doing which the glass is broken into a thousand pieces! The reason of this is, that the lead does not scratch the surface of the glass; whereas the sand being sharp and angular, scratches, it sufficiently to produce the effect here spoken of.—*Gill's Repos.*

Gold Size.—The gold size used in England is composed of red lead and fine yellow ochre, ground in fat oil, that is, a thick linseed oil, which has by age assumed a fat unctuous consistence, which gives it a peculiar fitness for this use. Gold size thus made is of the colour most suitable to hide any defects in the gilding; it possesses all the good properties of that used by the French, and is free from its bad ones. It may be made in large quantities, and with proper precaution be kept for years.—*Franklin Journ.*

Gilding in Oil.—1. The first operation is to give a priming coat of colour, formed by grinding white lead in oil rendered drying by boiling with litharge, and tempered afterwards with linseed oil, adding a little fat oil, and a very small portion of spirits of turpentine. 2. Grind calcined white lead very fine in fat oil; this must immediately be tempered with oil of turpentine, as it is subject to become thick very quickly. Three or four thin coats of this are to be given very evenly in the ornaments, and in all parts intended to be gilt. Care must be taken in applying the colour to the deeper parts of the work, that it may be even and perfect. This is the *teinte dure*, or hard ground. 3. The gold colour or size, previously strained through fine linen, is then to be laid on very thin and even, with a soft brush which has been used for oil colours. A smaller brush must be used for the deeper parts of the sculptured or other ornaments, carefully observing to remove any hairs which may be detached from the brush. 4. Where the size is so far dried as to become tacky, the gold leaf is to be spread upon the cushion, and divided with the knife; the gold is placed on with a small block of wood, faced with cloth, called a *palette*, and lightly pressed with cotton, repairing where necessary, with pieces of gold cut small, applied by a badger's hair pencil. 5. If the articles gilt are to be exposed to the weather, as balconies, gratings, statues, &c. they ought not to be varnished, as gilding in oil is more durable without, than with varnish. The heat of the sun will, after a heavy rain, cause gilding covered with varnish to craze or crack over its whole surface. Gilding in the interior of a building, as on the rails of stair cases, &c. should have a coat of spirit of wine varnish, drying it by means of a chafing dish, and then applying a coat of oil varnish. The beauty of oil gilding depends greatly upon the manner of varnishing it.—*From the French.*

Advantages of employing Charcoal to Light Fires.—The chemist and the metallurgist are well acquainted with the value of charcoal for the purpose of lighting their fires; but it yet remains to point out its very superior advantages over that most extravagantly expensive article of domestic economy, fire-wood, in domestic life. When a fire is already kindled, in order to light another fire with charcoal, we have only to lay three or four pieces of it between the bars of the grate; and having then laid a few bits of fresh coal upon the bottom of the grate in which the second fire is to be made, to lay the kindled pieces of charcoal upon them, only taking care that the ignited parts be placed in juxta-position. These may then be covered either with embers or with pieces of fresh pit coal, and upon directing the blast of the common hand bellows upon them, the heat of the charcoal will be immediately greatly excited, and the more vehemently we blow, the more vividly will the charcoal burn, and instantly communicating fire to the fresh coal, the flame from that will farther aid the combustion of the charcoal, and a brisk fire be presently made. In the case of there being no fire previously lighted, we must ignite the pieces of charcoal by directing the flame of a lamp or candle upon them with the blowpipe, and then proceed as above directed.—*Gill's Repos.*

Preservation of Skins.—A tanner in Hungary uses with great advantage the pyroligneous acid in preserving skins from putrefaction, and in recovering them when attacked. They are deprived of none of their useful qualities if covered by means of a brush with the acid, which they absorb very readily.—*Jameson's Journ.*

Horse Brush.—A pamphlet published at Paris by a M. Goetz, recommends a substitute of his invention for the twist of straw commonly used in dressing horses. The brush, which the inventer dignifies with the title of *brosse hygiénique*, is an imitation of the kaffah, or brush of the Arabs. It is composed of a tissue of horse-hair, enfolding a pad of the same material, backed with thin iron plates, and covered with varnished leather. It is, moreover, furnished with a strap across the width of the back as an ordinary brush. The web which covers the pad, which is equally flexible and strong, it is averred, penetrates the hair and to the hide of the animal better than any other instrument, and removes all foreign substances, however minute. The size is the same as that of the usual horse brush; covers an equal portion of the surface at a time; clears out all the cavities in passing over them, and on this account accelerates the process of dressing. *Bull. Univ.*

Ribancourt's Ink.—Take of Aleppo galls, in coarse powder, 8 oz.; logwood, in thin chips, 4 oz.; sulphate of iron (green copperas,) 4 oz.; gum arabic, finely powdered, 3 oz.; sulphate of copper (blue vitriol,) 1 oz.; sugar candy, 1 oz. Boil the galls and logwood together in twelve pints of rain water for one hour; strain the decoction, and then add the other ingredients; stir the mixture until the whole be dissolved, more especially the gum; then let it subside for twenty-four hours; lastly, decant the ink very steadily, and cork it in stone bottles for your use.—*Mirror.*

Port Wine.—Official accounts of the exportation of Oporto wine for eight years. It cannot escape notice that England is the only country that drinks Port for the benefit of the wine-growers of the Douro.

In 1818, the Factory wine exported from Oporto amounted to 32,843 pipes; of this quantity 32,465 were for England.

In 1819, the total quantity exported was 19,502 pipes; nearly the whole to Great Britain.

In 1820, the quantity exported was 23,740 pipes; almost the whole to Great Britain.

In 1821, 24,641 pipes; nearly the whole to Great Britain.

In 1822, 27,758 pipes; of which 27,470 pipes came to Great Britain.

In 1823, 23,578 pipes; of which 23,208 came to Great Britain.

In 1824, 19,164 pipes; the same proportion to Great Britain.

In 1825, 40,524 pipes; of which 40,277 came to Great Britain.

In 1826, 18,604 pipes; of which 18,310 came to Great Britain.—*For. Quart. Rev.*

The Seasoning of Timber has hitherto been effected by evaporating the sap, or fluid matter, by the action of the warmth and air of the atmosphere, screening the timber, at the same time, from the direct action of the sun, which, by drying it too rapidly, occasions twisting and renting. The time occupied is from three to five years. Mr. Langton, of Jermyn-street, has discovered a method of seasoning timber, by removing part of the atmospheric pressure, and applying artificial heat. Mr. Tredgold, the eminent engineer, has given it as his opinion, that this new process will effect its object most completely in as many weeks as the common process requires years, at an expense not exceeding 10s. per load, with the advantage of setting free at least half the capital required by the common method; "of rendering it unnecessary to spoil a good ship, by the use of wood full of its natural sap; and the still greater advantage of rendering the living tree available either for defence, convenience, or common use, in a few weeks after being felled, and in a state in which it may be trusted with safety; while, by the usual method, five years is not more than is necessary, to be equally free of risk from shrinking and decay." A discovery so spoken of by such a man as Mr. Tredgold, is likely to lead to the most important consequences in every department of carpentry. One result will probably be the disappearance of the dry rot. The first thing to be done is to contrive the most suitable apparatus for removing the atmospheric pressure, and we hope these will be produced at such a price as to be within the means of every country carpenter. Some details of this process will be found in the "Mechanic's Magazine" for June.—*Gard. Mag.*

On imparting Durability to Timber.—Some remarkable facts respecting the durability that may be given to timber, by artificial means, have been observed at Closeburn. The proprietor of that estate has for thirty years been in the constant practice of soaking all fir and larch timber, after it is sawed into plank, in a pond or cistern of water strongly impregnated with lime. In consequence of this soaking, the saccharine matter in the wood, on which the worm is believed to live, is either altogether changed or completely destroyed. Scotch fir-wood, employed in roofing of houses and other indoor work, treated in this manner, has stood in such situations for thirty years, sound, and without the vestige of a worm. In a very few years, fir-timber so employed, without such preparation, would be eaten through by that insect. It might, perhaps, be advisable, in all timber used for ship-building, to soak it for some days in lime-water.—*Mr. Menteath, in Jameson's Journal.*

New Refrigerator.—(See the Engraving.)—Dr. Arnott, in his excellent treatise on Physics, suggests that an apparatus, made on the principle represented in the engraving—viz. with an arrangement of many thin, flat tubes, instead of a single large tube, for the descending fluid, and a spacious box, *c g*, to contain these and the rising fluid—would be an excellent *refrigerator* in a distilling apparatus, and for cooling the wort of brewers; or would serve as a means of diminishing the expense of warm baths, by transferring the heat from the water lately used to pure water. In distilling, the *wash* or *low wines* about to enter the still, might be used as the cold condensing fluid to surround the worm or vapour-tubes, and thus, without expense, would be heated in its progress to the still. Half the original expense of a great porter brewery is in the construction of the numerous water-tight floors on which the hot wort is thinly spread to cool. Boiling water from the vessel *e*, for instance, may descend slowly by the small tube *e a b f*, which is surrounded from *a* to *b* by cold water ascending through the tube *c g*. Then, as the temperature of two liquids which are brought so nearly in contact with each other, will not, after a very short time, differ in any one place more than a few degrees, it follows that the water lately cold, will, on leaving the part of the tube *g*, which is in contact with the boiling water descending directly from *e*, be nearly boiling, while the water lately hot, will, on leaving the tube at *b*, which is in contact with cold water just arrived from *h*, be itself nearly cold; and thus equal quantities of hot and cold water will have exchanged temperatures. The flux of the hot water is to be regulated by a cock *b*, and that of the cold water by a cock *h*. The water in the part of the tube *c g d* rises, because it is hotter and lighter than that in the part *h c*.

Cloth made from Whalebone.—M. Schultz, of Prugue, has lately taken out a patent for the manufacture of a kind of cloth from whalebone. We are informed that the cloth obtained from this process bears a strong resemblance to silk, and is particularly adapted for making cravats, under-waistcoats, ribands, &c.—*Lond. Jour. Arts.*

Consumption of French Wine in Britain.—From a very valuable little work, lately published, under the title of "A Classification and Description of the Wines of Bordeaux, by M. Paguirre," it appears, that, owing to our high rates of duty, England, the richest country in Europe, uses less French wine than even the poorest nation, if we except Sweden. Hamburgh, alone, takes above eight times, and Holland twelve times, as much as the British Isles. If it be said that we import an immense quantity of wine from Portugal, so do these countries from the Rhine, whose banks, from the confluence of the Moselle to Schaffhausen, which are often steep, gravelly, and rocky, as around Hocheim, are peculiarly well adapted to the culture of the vine.

Closeburn Lime Kilns.—The kilns employed at Closeburn Works are built on the side of a hill, and they are of two forms, the circular and the oval. The circular kiln has cast-iron doors to the fuel-chamber and ash-pit, and a cast-iron cap or cover, which, turning on a pivot, and resting on a curb-ring fixed on the top of the masonry of the kiln, can be put on or off the top of the kiln when required. This iron-cover, having a chimney 12 inches in diameter, fitted up with a damper, prevents the escape of heat at all times; and when the country sale is irregular, keeps the fire from going out, by being kept close as well as the doors below. One of these circular iron-topped kilns (which is stated to be 32 feet high from the furnace, 3 feet diameter at top and bottom, and 7 feet diameter at 18 feet from the bottom) will deliver daily of well-calcined lime three-fourths of its contents. Closeburn lime-work, receiving its fuel from a great distance, 25 miles or more, it is found to be a considerable saving of carriage to coke or char the coal at the pit. A measure of coke burns as much as the same measure of coal, but it is used only in this kind of kiln. The oval kiln varies somewhat in its proportions from the circular. The oval form has been found preferable when coal is the fuel employed. It is built in a similar situation with the circular. It has windows to the fuel-chamber and ash-pit, and an arched cover formed of an iron-frame, filled up with brick, with a chimney, the whole moving with wheels on a rail-way; and, by means of windlasses, it can be drawn off or on the top of the kiln. The height of this oval kiln is 35 feet; the short diameter at the fuel-chamber is 22 inches; and, at the height of 20 feet, the short diameter is gradually extended to 5 feet, and is so continued to the top, where the oval is 9 feet by 5 feet; and, having a broad fuel-chamber, it requires three separate doors or openings, more speedily to draw out the lime. From this oval-kiln, three-fourths of its contents may be drawn out daily; and, when it is closed at top and bottom, the fire will not go out for five or six days.—*Mr. Menteath, in Jameson's Journal.*

Spirit Varnish, for mixing with colours to be laid upon Wood.—In a matras, capable of containing two Paris pints of liquid, put a pint, or about two pounds, of good spirit of wine, and throw in four ounces of shell-lac, broken into small bits, together with two ounces of gum sandarach, and one ounce of gum mastick in tears, grossly powdered; you also add one ounce of oil of spike, and place the vessel upon a ring of straw, laid upon the bottom of a boiler filled with water; the whole must be then heated in a furnace over a charcoal fire, and the contents be stirred from time to time, until the gums are entirely melted; but care is to be taken that the spirit of wine be not heated to its boiling point. This varnish, when cold, is good; that is to say, fit to mix with lamp-black, vermilion, or other opaque colours, where the colour of the varnish does no harm; but when it is to be used alone, to give a fine polish, it should be filtered, either through cotton or filtering paper, when it will become as clear as wine which is a little coloured.—*Gill's Tech. Rep.*

Lavender Water.—Take of English oil of lavender flowers, three drachms; oil of angelica root, six drops; rectified spirit of wine, one pint. After being shaken in a quart bottle, add one ounce of fresh orange flower water, an ounce of fresh rose water, and four ounces of distilled water. To this composition, those who like the musky odour may add two or three drachms of the essence of ambergris, or of the essence of musk. Some chemists use the French oil of lavender, which is not one-fourth the price of the English oil; and this has lately been as soft and fragrant as the latter, and by druggists in the country is generally sold for it.—*Gaz. Health.*

Improvement of Candles. By John Murray, F.L.S.—I steep the cotton wick in lime-water, in which I have dissolved a considerable quantity of *nitrate of potassa,* (*chlorate of potassa* answers still better, but is too expensive for common practice;) by this means I secure a purer flame, and superior light; a more perfect combustion is insured; snuffing is rendered nearly as superfluous as in wax candles, and the candles thus treated do not "*run.*" The wicks must be thoroughly dry before the tallow is put to them.—*Brewster's Journal.*

Distilling Alcohol from Blackberries and Raspberries.—Mr. Evans has produced a very fine specimen of pure alcohol, which he states he has distilled from a very common and well-known English vegetable, but which he had never before known applied to this purpose. The alcohol has the flavour of French brandy. Mr. Evans says that an experiment is now making, on a large scale, in North Wales, to cultivate the bramble for this purpose; that it readily grows from cuttings planted in a good soil, and which produce fruit the same year; they are to be trained on low frames, to prevent them from trailing upon the earth, and the berries are greatly increased in size from the culture. He does not intend to patent his discovery, but to exercise it for the public benefit.—*Gill's Technical Rep.*

The Royal Italian Blacking.—Take of ivory black, nine pounds; lamp black, four ounces; treacle, nine pounds; olive oil, twelve ounces; gum arabic, four ounces; green copperas, six ounces; common vinegar, four gallons. Dissolve the gum arabic in four ounces of water, and mix all the articles with it in an open vessel, and when well blended, add gradually (briskly stirring the mixture) eight ounces of oil of vitriol. The composition, after standing two days, (during which time it should be well stirred up twice a day with a wooden spatula,) will be fit for use.—*Gaz. Health.*

Manufacture of Straw Hats at Florence.—It is chiefly in the neighbourhood of Florence, Pisa, the district of Sienna, and in the upper part of the Valley of the Arno, that the best mats are made for straw hats. In these countries, whole families, old and young, may be seen occupied at this kind of work; and it is certain, that this branch of industry brings in a very large sum annually to the country. The cost of the raw material is inconsiderable; but the value of the work is so great, that the women of the Valley of the Arno commit their domestic affairs to people from the mountains, that they may be able to devote all their time to the lucrative manufacture of straw plait. The following is the information which the author of this notice has obtained relative to this kind of industry. The straw used in working these mats, is grown in districts mountainous and sterile. It is produced from a kind of wheat, of which the grain is very small. This straw, though slender, has much consistence, and the upper part of the stalk, being perfectly hollow, is easily dried. It is pulled out of the earth before the grain begins to form. After being freed from the soil, which adheres to the root, it is formed into small sheaves to be winnowed; the part above the last joint of the stem is then plucked off, which is from four to six inches long, the ear remaining attached to it. This being done, it is bleached alternately by the dew and the sunshine. Rain is very injurious to it, and destroys much of its whiteness. When a sudden shower comes on, every one is in motion gathering up the straw. The lower parts of the straw are treated in the same manner, and employed in forming mats of an inferior quality. The upper parts, torn off just to the knot, are sorted according to their degree of fineness. This stapling is made with much care, and usually affords straw of three different prices. A quantity of straw worth three quarters of a paoli (4½*d.*,) after having undergone this process, is sold for ten paoli (4*s.* 7*d.*) The tress is formed of seven or nine straws, which are begun at the lower end, and are consumed, in plaiting, to within an inch and a half of the upper extremity including the ear. All the ends of the straws that have been consumed are left out, so that the ears shall be on the other side of the tress. As fast as it is worked it is rolled on a cylinder of wood. When it is finished, the projecting ends and ears are cut off; it is then passed with force between the hand and a piece of wood, cut with a sharp edge to press and polish it. The tresses thus prepared, are used so that a complete hat shall be formed of one piece. They are sewed together with raw silk. The diameter of the hat is in general the same, the only difference consists in the degree of fineness, and, consequently, the number of turns which the tress has made in completing the hat. These hats have from twenty to eighty such turns, the number regulating the price, which varies from 20 paoli (9*s.* 2*d.*) to 100 piastres (upwards of £20.) Those of the first quality have no fixed price. A hat which sells for 100 piastres affords a profit of 40 to the merchant; the straw and silk costing 20 piastres, and the labour 40 piastres. The workers gain about 3 or 5 paoli (1*s.* 4*d.* or 2*s.* 3*d.*) per day. Several mercantile houses at Florence and Leghorn buy these hats on the spots where they are worked. There is one of these houses which annually exports them to the value of 400,000 florins (£3,500.) French speculators have tried to cultivate this sort of straw, but they have not been able to obtain so fine a quality as that of Tuscany. Before bringing them to sale, the hats are once more subjected to bleaching by sulphur.— *From the French.*

Mortar.—The use of lime in mortar is to fill up the hollow spaces or vacuities between the grains of sand, and to cement them together, thereby forming a kind of artificial stone. To add any more lime than is sufficient to fill up these spaces seems to be useless, and to add much more must weaken the mortar; but, if too little lime be used, there will be cavities left between some of the grains of sand, and the mortar will consequently be short or brittle; therefore, when we cannot ascertain the best proportions of lime and sand, it is better to use too much lime than too little.— *Gardener's Magazine.*

Sugar from the Beet Root.—An establishment is now forming, in the neighbourhood of Paris, for the manufacture of this sugar on a very extensive scale. A British gentleman is said to have offered a house called the Chateau d'Ormes, and an immense territory for the culture of the beet. More than sixty establishments are, or soon will be, in activity in all parts of France for this manufacture; and we believe, from calculations recently made, that the sugar from the beet root, by means of the ameliorations lately introduced in the processes of baking and crystallisation by various manufacturers, particularly by M. Crespel d'Arras, may before long enter into competition even with the sugar of the Indies.—*From the French.*

Cement for Ships' Bottoms.—In Spain, the following cement has for many years been used for the preservation of ships' bottoms. Take the best barrelled stone lime, and slake it, by pouring upon it just enough fresh water to produce that effect, and to cause it to fall into a dry white powder; when cool, sift this through a fine wire sieve, into a trough; then add to it a portion of common fish-oil, sufficient to bring it to the consistence of soft putty, so as to work with ease under the trowel. On the second day of sheathing the vessel, the plasterers put on the width of two or three streaks, all fore and aft; the next day it requires a tinge of yellow, and is much harder than when put on, and at length it becomes as hard as plaster of Paris. It has been suggested that this cement might be substituted for the costly Roman or Dutch water cements.—*Franklin Journal.*

American Porcelain. A manufactory of porcelain has been established in Philadelphia, of the productions of which Professor Silliman speaks in the following flattering terms: "The porcelain of Philadelphia is very beautiful in all the principal particulars; in symmetry of modelling, in purity of whiteness, in the characteristic translucence, in smoothness and lustre, and in the delicacy and richness of the gilding and enamel painting. That it rivals the finest productions of Sevres itself, it is not necessary to assert; but it certainly gives every assurance, that if properly supported, it will not fail to meet every demand of utility and taste, which this great and growing country may present." The raw material is very abundant at a little distance from Philadelphia, and is found in many other parts of the United States.

Fly Water. Prussic Acid has been obtained from the leaves of *green tea*, in so concentrated a state that one drop killed a dog almost instantaneously. A strong infusion of Souchong tea, sweetened with sugar, is as effectual in poisoning flies as the solution of arsenic, generally sold for that purpose. *Mirror.*

Vegetable Rouge and Pink Saucers. These articles are prepared from the florets of the *Carthamus tinctorius*, which in the dried state are kept by druggists under the name of safflower, in the following manner: Wash safflower, till no stain is given to the water, and then dry it. Of this take half an ounce; infuse it a short time in a pint of water, in which a drachm of the subcarbonate of soda has been previously dissolved; strain off the liquid, to which add an ounce of finely levigated French chalk. The alkali will hold the colouring matter of the safflower in solution, and the chalk will remain colourless; but by adding a little tartaric or citric acid, the alkali will be neutralised, and the red colouring matter, which is not soluble in simple water, being set at liberty, will fall to the bottom, combined with the chalk. Thus a beautiful pigment is produced, which may be dried and further levigated for spreading on saucers; or, ground with a drop or two of olive oil, will form the Spanish or vegetable rouge. Liquid pink dye is a similar preparation, with a portion of spirit of wine.
Gazette of Health.

Composition for Washing in Sea Water.—Take a highly concentrated solution of the alkalis, soda, or potash, with an equal weight of any earthy base, (China-clay or porcelain earth is best.) These materials being mixed together are to be ground in a mill in the same way as white lead is ground, and this will produce a thick paste, one pound of which is sufficient to soften four gallons of sea water.—*Newton's Journal.*

English Lacquer or Varnish, for Brass or Silver.—This varnish gives to metals a colour but little differing from gilding in *or-moulu*. Take two ounces of seed-lac, two ounces of yellow amber, forty grains of dragon's blood, half a gros* of saffron, and forty ounces of good spirits of wine; let the whole infuse and digest in a matras, upon a gentle sand-bath, frequently stirring them from time to time. When the gums are dissolved, the varnish must be passed through a fine white linen cloth, and be put into a well-corked phial. As the success of this varnish greatly depends upon the manner in which it is employed, so the brass must be perfectly clean, and for this purpose it may be dipped in aqua-fortis, and well washed; and, above all, the bright parts must be highly burnished. The brass, thus prepared, must be heated so hot, that the hand can hardly bear to touch it, when the lacquer is to be immediately applied.—*Gill's Tech. Rep.*

American Patent Paper, made of Straw, &c.—This improvement consists in preparing straw, hay, or other vegetable substances for the manufacture of paper, in the following manner:—Take any quantity of straw, hay, or other vegetable substances, and boil it in a solution or ley of pot or pearl-ash, or other alkali or lime, in the following proportions, viz. to one hundred and fifteen pounds of straw, hay, or other vegetable substance, add from fifteen to twenty pounds of the salts or ley of pot or pearl ash, or other alkali or lime, and boil them about thirty minutes, or steep the materials in the solution a few days, or until saturated, then draw off the water, and put them into a common engine, to be manufactured into paper, like rags. —*Tech. Rep.*

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* The gros is equal to 59.0703 English troy grains.

Improved Paving Mortar.—It is well known that the mortar used for paving quays, the courts or yards of hotels, or other buildings, is greatly improved by being mixed with the *caput mortuum*, or residuum from the distillation of aqua-fortis, when baked, ferruginous clay is used for the decomposition of the nitre.—*Gill's Repos.*

To Preserve Wine in Draught.—M. Imery of Toulouse, gives the following simple means of preserving wine in draught for a considerable time; it is sufficient to pour into the cask a flask of fine olive oil. The wine may thus continue in draught for more than a year. The oil spread in a thin layer upon the surface of the wine hinders the evaporation of its alcoholic part, and prevents it from combining with the atmospheric air, which would not only turn the wine sour, but change its constituent parts.—*From the French.*

Gilding Metal Buttons.—Wax to exalt the colour of red gold. To four ounces of yellow melted bees-wax add, in fine powder, one ounce and a half of red ochre, one ounce and a half of verdigrise, calcined till it yields no fumes, and half an ounce of calcined borax; mix them well together. It is necessary to calcine the verdigrise, or else by the heat applied in burning off the wax from the surfaces of the gilt works coated with it, the acetic acid in the verdigrise would be so concentrated, that it would corrode these surfaces, and make them appear speckled.

To exalt the colour of green gold. Take saltpetre one ounce ten dwts., sal-ammoniac, one ounce four dwts., and verdigrise eighteen dwts., and dissolve a portion of the mixture in water, as occasion requires.

To exalt the colour of yellow gold. Take saltpetre six ounces, green copperas two ounces, white vitriol and alum of each one ounce. If the colour be wanted redder, a small portion of blue vitriol must be added. These are also to be dissolved in water, as wanted.

These two last compositions must be applied to the surfaces of the gilt works either with a pencil, or by dipping them into them; a proper degree of heat must then be used to cause them to assume a a black colour, when they must be quenched or cooled either in vinegar or water.—*Gill's Repos.*

Public Roads.—The turnpike-roads of England are above twenty thousand miles in length, and upwards of a million sterling is annually expended in their repair and maintenance.

Glass-house Cinders, employed in Hydraulic Mortar.—When the bridge of Louis XVI. was constructed, much advantage was derived from mixing with the hydraulic mortar which was used, a portion of the clinkers, more or less ferruginous, which had passed through the grates of the glass bottle furnace, at Meudon, near Sevres. These clinkers were pulverized and introduced into the mortar used, and contributed to its rapid consolidation. The same benefits were experienced when the jetties and fort at Cherbourg were built; the clinkers having been obtained from the glass-house of Tour Laville, about a league and a half distant from that part.—*Gill's Repos.*

Muscovia Glass.—A considerable quantity of an article under this name has, within this last three years, been imported from Siberia, for the use of brewers, who have found it to answer the purpose of fining and correcting stale beer. It is a mineral product, containing magnesia, and affording, on boiling, a considerable proportion of gelatin. The magnesia neutralises a portion of the acetous acid in the stale beer; and the gelatin, on decompositing, carries down with it all the suspended impurities. We are told a pound goes as far in fining beer as two pounds of isinglass. The price of it is about 3*s.* 6*d.* per pound. It would probably answer the same purpose in fining cider; but to prevent the magnesia from neutralising a portion of the malic acid, a little dilute sulphuric acid should be added to the jelly, in order to neutralize the magnesia it may contain. It is used in the same manner as isinglass.—*Gaz. of Health.*

Boiling Water.—Mr. Jones, of the Strand, has recently invented a very neat and complete apparatus for boiling a small quantity of water, and consequently for preparing any slight matters which may be required for the chambers of nurses or invalids. In a small tin tray are placed two vessels of about the capacity of a pint each; in one is a cylinder over a lamp; the other is simply a pan, into the lower part of which runs a close funnel, like the extinguisher of a candle. Into the cylinder is put a small measure of spirits of wine; the lamp below is trimmed with the same; and from the upper vessel a curved tube is brought to point horizontally upon the flame. As the alcohol is heated, the gas issues from this tube as if it were a blowpipe, and a jet of flame is propelled with the force of a furnace into the funnel of the opposite vessel. By this ready and easy process, water-gruel, or any other liquid, is warmed in two or three minutes, and eggs boiled in less than five. *Lit. Gaz.*

Cement for Cisterns.—To preserve the bottoms of cisterns, and to render them impermeable to water, resinous bodies have been employed, and particularly liquid pitch or tar. One inconvenience, however, appeared in the use of pitch, which was its property of becoming soft during the heat of summer. This inconvenience has been remedied by sprinkling the pitch over with powder of lime; the lime combines with the pitch, and forms a stratum of a new cement, resembling the famous cement of the Romans, called maltha.—*Gill's Repos.*

DOMESTIC ECONOMY.

Pear Syrup.—This is one of those preparations of fruits, which, though little, if at all known in England, form an important branch of rural economy in many parts of the Continent, enabling the peasants to derive profit from their vast crops of pears, which would otherwise in great part be useless. In preparing it, the pears are first heated in a copper over the fire, until the pulp, skins, &c., have separated from the juice, which is then strained, and gently boiled down to the consistence of molasses, which in appearance and colour it exactly resembles, but with a more agreeable flavour, combining that just portion of sweet and acid which would be relished by any palate not very fastidious. A considerable part of this syrup is consumed by the peasants in their own families, and the rest sent to market in the town, where, at a price considerable less, it supplies the place of molasses, being given by the poor to their children on thin slices of bread, and largely used by the pastry-cooks in the preparation of gingerbread.—*Gard. Mag.*

Cheap Filtering Apparatus.—An economical filtering apparatus may be made as follows. Take an unglazed inverted vessel, manufactured at potteries for the use of sugar-bakers, and place it through a hole in a triangular board, resting upon two ledges, occupying a corner in a kitchen or any other apartment. In the inside of the pot a bushel of the whitest sand is to be introduced; which sand, after being washed in a clean tub with about three changes of water, to dissolve and clear away the clayey matter, is to be mixed with half a peck of finely-bruised charcoal. This will fill about one-third of the pot; but before the sand is placed in the vessel, the small hole at the bottom of the pot should have an oyster-shell placed over it, with the convex side uppermost, to prevent the sand washing through. This filters foul water perfectly pellucid and clear very quickly. When the sand becomes foul by time, it can be taken out and washed, or fresh materials can be repeated; great care should be observed not to put more water in the pot than your vessel underneath will receive.—*Mirror.*

Turkish method of Preserving Filberts.—When perfectly ripe, remove the husks, and dry the nuts by rubbing with a coarse cloth; sprinkle the bottom of a stone jar with a very little salt; then place a layer of filberts, adding a small quantity of salt between each layer. The jar must be perfectly dry and clean. Secure the top from air, and keep them in a dry place; and at the end of six months they will peel.—*Gard. Mag.*

Striking Light.—After all that has been done, the German and French practice of striking fire with the flint and steel, upon a piece of amadou, or

German tinder, laid upon the flint, near to its edge, is most to be relied upon. There is no trusting to the strength of the sulphuric acid contained in the fire bottles commonly sold, as it is continually attracting moisture from the air, owing to the imperfect manner of closing the bottles; and when we wish to employ it after standing awhile, it most commonly fails to ignite the chemical matches. It is, therefore, well worth while to acquire a facility in procuring fire and light in the manner above indicated, with the flint and steel and German tinder, now so commonly employed here by those who are in the habit of smoking cigars.—*Tech. Repos.*

Onion Soup is thought highly restorative by the French. It is considered peculiarly grateful, and gently stimulating to the stomach, after hard drinking or night-watching, and holds among soups the place that champagne, soda-water, or ginger-beer holds among liquors.—*Mirror.*

Extinction of Fires.—When a chimney or flue is on fire, throw into the fire-place one handful after another of flower of sulphur. This, by its combustion, effects the decomposition of the atmospheric air, which is, in consequence, paralysed, or in effect, annihilated.—*Gard. Mag.*

Arrow Root.—The adulteration of this very valuable article of diet, for children and invalids, with fine flour of wheat, or what is termed potato starch (a common practice in this metropolis,) M. Visey says may be easily detected; ten grains of the flour, or of the potato starch forming, with two ounces of boiling water, a pretty strong jelly, while the same proportion of genuine arrow-root forms a very thin jelly. The jelly of the true arrow-root will retain its solidity three or four days, while that of the potato starch, or the food from what are termed "tops and bottoms," becomes nearly as thin as water in the course of two days; a fact that strongly points out the superiority of arrow-root over the potato starch, or "tops and bottoms" as a nourishing article of diet.—*Gaz. of Health.*

Dried Cherries are a very useful article for the dessert in the winter and spring. Nothing can be more easy than to dry them. Gather when ripe, and do not break or bruise the skins; spread them on earthen-ware dishes, and place them in a very cool oven; the next day increase the heat, and at the end of a very few hours, they will be found sufficiently dry for putting into close vessels. The Kentish cherry, being rather acid, requires a longer time than any other cherries; but they are also more valuable, because, in fevers, they are used to moisten the mouth.—*Gard. Mag.*

A very ready and elegant mode of procuring Curds, and also a pleasant acidulous whey, is by adding to a glassful of milk a little solution of citric acid, taking care not to add too much. An experiment or two will readily show the quantity necessary to effect the purpose.—*Times.*

Steaks.—People who want to enjoy a steak should eat it with shalots and tarragon. Mr. Cobbett says, an orthodox clergyman once told him that he and six others once ate some beef-steaks with shalots and tarragon, and that they "voted unanimously, that beef-steaks never were so eaten before."

Tea.—For the whole of our annual imports, including factory expenses and commission, the original cost in China amounts to the sum of two millions sterling. This is wonderfully increased before the British public can have any access to the article of consumption; thus:—

1.	The value of the Company's importations from China into Great Britain, as established by their own statements, is	£2,000,000
2.	On this they charge 100 per cent, for their own especial benefit	2,000,000
3.	And the Government duty, as by law established, is equal to the original cost, and the profits charged by the company, both forming the sale price	4,000,000
		£8,000,000

The consumption of tea is increasing every year. In 1823, the importation was 24,000,000 lb.; in 1826 it was 30,000,000 lb.; and in the year ending Jan. 5, 1828, 39,746,147 lb. *Oriental Herald.*

Sting of a Wasp. The bulb of an onion or garlic, cut and applied immediately to the place stung, instantly removes the pain.

Cure for the Jaundice.—Cut a ripe lemon in two parts and take out the seeds; procure as much turmeric as will lay on the end of a knife, with about five grains of saffron; put them all in the place of the seeds; then stick some cloves in, and tie the two halves of the lemon together; wrap it in a sheet of paper, and roast it for one hour in pot ashes. Take off the paper, and steep the lemon in a gill of white wine; afterwards cover it closely, and let it stand all night: in the morning, squeeze the lemon into the wine and strain it off. It must be all drunk off before eating. This mixture, twice or thrice repeated, is quite sufficient for a cure.—*Mirror.*

Water which takes out Stains or Spots upon Silk, without injuring their colour.—Take five parts of common water, and six parts of alum well pounded; boil the mixture a short time; after which pour it into a vessel to cool. Previous to using, the mixture must be made warm; then wash the stained part with it and leave to dry.—*From the French.*

French method of making Coffee. The principal points are these: The coffee, *Turkey or Bourbon*, should be roasted only till it is of a *cinnamon colour*, and closely covered up during the process of roasting. In France this is done in closed iron cylinders, turned over a fire by a handle like a grindstone. The coffee should be coarsely ground soon after it is roasted, but not until quite cool; some think its *aroma* is better preserved by beating in a mortar, but this is tedious. The proportions for *making coffee* are usually *one pint of boiling water to two and a half ounces of coffee.* The coffee being put into the water, the coffee-pot should be covered up, and left for two hours surrounded with hot cinders, so as to keep up the temperature, without making the liquor boil. Occasionally stir it, and after two hours' infusion, remove it from the fire, and allow it a quarter of an hour to settle, and when perfectly clear, decant it. Isinglass, or hartshorn shavings, are sometimes used to clarify coffee; but by this addition you lose a great portion of its delicious aroma.

Coffee in England is generally *over-roasted*, and from this fault arise all the inconveniences which are so often attributed to coffee, but which, in reality, are produced by the imperfect modes of its preparation. *From the Coffee-Drinker's Manual, translated from the French.*

Stains of Oil upon Satins, Stuffs, or Paper.—If the stain be not too old, take the burnt ashes of sheep's bones, and put them warm upon, and under, the part stained; place thereupon a weight, and let it remain so for one night. If the stain be not thoroughly effaced, repeat the operation till it disappears. It is necessary to remark, that this powder, if the weight be left upon the part too long, will efface the printed characters upon paper.

Stammering.—Those who suffer under the distressing affliction of an impediment in their speech, may be effectually cured; where there is no malformation of the organs of articulation; by *perseverance* for three or four months in the simple remedy of *reading aloud with the teeth closed*, for at least two hours in the course of each day. The recommender of this simple process adds, "I can speak with certainty of the utility of the remedy."—*Lit. Gaz.*

Cure for the Asthma.—Take three quarters of an ounce of senna, half an ounce of flour of sulphur, two drams of ginger, and half a dram of saffron; then mix them with four ounces of honey. Take the quantity of a nutmeg night and morning, and a *speedy cure will be the result.*—*Mirror.*

Wine.—Light dry wines, such as *Hock*, *Claret*, *Burgundy*, *Rhenish*, and *Hermitage*, are, generally speaking, more salubrious than the stronger varieties, such as *Port*, *Sherry*, or *Madeira*. *Claret*, in particular, is the most wholesome wine that is known. *Champagne*, except in cases of weak digestion, is one of the safest wines that can be drunk. Its intoxicating effects are rapid, but exceedingly transient, and depend partly upon the carbonic acid, which is evolved from it, and partly upon the alcohol, which is suspended in this gas, being applied rapidly and extensively to a large surface of the stomach.

Dr. Babington says, a half-pint of wine for young men in perfect health is enough, and you will be able to take your exercise better, and feel better for this abstinence.

Marriage. There are few labourers of either sex who live to old age unmarried; scarcely any, it has been said, of tolerable character; and this remark may be confirmed by any person's observation.

To clean Bottles infected with bad Smells.—Put into bottles, so affected, some pieces of grey or brown paper; fill them with water; shake the bottles strongly; leave them then a day or two in this state, when, finding them more or less affected, repeat the process, and afterwards rinse them with pure water.

Grease Spots from Silk. Take some ether and wash the soiled part, when the grease will disappear.

To make the Oil in Lamps last longer, and to remove the thick smoke which is so disagreeable and hurtful to the Lungs.—Dissolve, in a glass of water, as much salt as will fully saturate the water, and steep in it the wick, which must be afterwards dried: pour into this water an equal quantity of oil, and then put them into a bottle and well shake them, in order to mix them together; trim your lamp with this mixture and the prepared wick. The linseed oil is the principal oil which has been used in this experiment, but other oils, it is said, will answer the same purpose.

Robins's Filtering Cisterns.—A filtering apparatus has just been introduced to public notice, which, to judge from the reports of scientific men, is worthy of especial patronage. Professor Brande, and Mr. Hume, the chemist, are among the testimonies to its utility. Filters for the largest cisterns do not, it appears, exceed the price of six guineas, whilst those for smaller are in due proportion. In Paris, all cisterns are furnished with filters; and when we recollect the turbid state of the Thames water, we are surprised that their introduction was never before attempted in London.

Servants.—A fund has lately been established at Stockholm, from which it is intended to reward good and faithful servants. The king has contributed to it 1,000 crowns; the prince royal 500; and the princess royal 300. This has been suggested as an example worthy of our imitation; many legacies, &c. have from time to time been bequeathed for the encouragement of faithful servants in England; some are claimed, but the majority are shamefully misapplied by those to whom their distribution has been entrusted.

Preservation of Eggs.—Relative to the preservation of eggs by immersion in lime-water, M. Peschier has given most satisfactory evidence of the efficacy of the process. Eggs which he had preserved for six years in this way, being boiled and tried, were found perfectly fresh and good; and a confectioner of Geneva has used a whole cask of eggs preserved by the same means. In the small way, eggs may be thus preserved in bottles or other vessels. They are to be introduced when quite fresh, the bottle then filled with lime-water, a little powdered lime sprinkled in at last, and then the bottle closed. To prepare the lime-water, twenty or thirty pints of water are to be mixed up with five or six pounds of slaked quick-lime, put into a covered vessel, allowed to clear by standing, and the lime-water immediately used.

Treatment of persons suffocated by noxious Gases.—If the body is yet warm, it should be freely exposed to a draught of fresh air; and cold water should be dashed over the head and chest. In other respects, it should be treated exactly as a drowned person. If the body is cold, warmth must be applied at first.—*Companion to the Almanac.*

Treatment of persons exposed to intense Cold.—1. Rub the body for a few minutes gently with snow, or melted ice, or if these cannot be had, with the coldest water that can be procured. Afterwards add small quantities of hot water, at intervals, to increase the warmth very gradually.—2. Use artificial respiration, and as soon as the person can swallow, give warm cordials, at first in very small quantities.—*Ibid.*

Treatment of persons in a state of excessive Intoxication.—1. These persons should have all tight parts of their dress loosened, the head should be covered with a cloth wet with cold water, and vomiting should be excited as quickly as possible, either by an emetic, or if the person cannot swallow, by tickling the throat with a feather, or the finger.—2. Glysters of salt and water should be given, and the person kept in the upright posture; and the head, on no account, be allowed to hang down. If recovery does not take place soon, mustard poultices should be applied to the feet; and if the extremities become cold, warmth and friction should be perseveringly used.—*Ibid.*

Bread.—If flour is new, after a wet season, carbonate of ammonia, of a pure quality, dissolved in warm water, and introduced into the dough when stiff, will remove all unpleasant effects, and make the bread quite light. The quantity required is 1 ounce to 14 pounds of flour.—The weight of bread is considerably increased, by using bran-water in kneading the dough. Three pounds of bran, boiled for an hour, is the proportion for 28 pounds of flour.—The following is a plan for introducing potatoes into wheaten bread:—Boil 5 pounds of potatoes well, then dry them over a fire or in the oven until they fall to pieces and become flour, which they will do, if properly managed; then make of them a batter, of the consistency of thick gruel: strain this through a coarse sieve or colander, then mix this, instead of water, with twenty pounds of flour. If the yeast be good, the bread thus made will be as light and agreeable as that made of all flour.—*Ibid.*

Indications of Wholesomeness in Mushrooms.—Whenever a fungus is pleasant in flavour and odour, it may be considered wholesome; if, on the contrary, it have an offensive smell, a bitter, astringent, or styptic taste, or even if it leave an unpleasant flavour in the mouth, it should not be considered fit for food. The colour, figure, and texture of these vegetables do not afford any characters on which we can safely rely; yet it may be remarked, that in colour, the pure yellow, gold colour, bluish pale, dark or lustre brown, wine red, or the violet, belong to many that are esculent; whilst the pale or sulphur yellow, bright or blood red, and the greenish, belong to few but the poisonous. The safe kinds have most frequently a compact, brittle texture; the flesh is white; they grow more readily in open places, such as dry pastures and waste lands, than in places humid or shaded by wood. In general, those should be suspected which grow in caverns and subterraneous passages, on animal matter undergoing putrefaction, as well as those whose flesh is soft or watery.—*Brande's Jour.*

Maturation of Wine.—M. de St. Vincent, of Havre, states, from his own experience of long continuance, that when bottles containing wine are closed by tying a piece of parchment or bladder over their mouths, instead of using corks in the ordinary manner. the wine acquires, in a few weeks only, those qualities which are only given by age in the ordinary way after many years.

New kind of Salad.—M. Bosc states, that three or four years since some grains of Indian cress (*Sisymbrium Indicum*, Linn.) were sent from the Isle of France to the Jardin du Roi, and having multiplied exceedingly, were tried by him as salad for the table, and have been judged of very favourably in consequence of their power of yielding salad during the winter. Indian cress forms small patches on the ground about three inches in diameter; its leaves are very numerous, are irregularly pinnated, have nearly round folioles, and about three lines in width; the flowers are small, white, and disposed in axillary and terminal pannicles; they begin to fade about March. The qualities which render this cress desirable for cultivation in our gardens, as a salad, are, 1st. That it is eminently antiscorbutic and depurative; 2nd. That its leaves are more tender and less acrid than those of other cresses, used as salads; 3rd. That it does not suffer from the hardest winters; does not require watering to ensure or favour its growth; and will supply leaves during the winter, and especially in spring. It is necessary that the seeds should be sown in ground in which none have been grown for some years preceding; its culture does not differ essentially from that of the corn-salad.—*From the French.*

New kind of Coffee.—Endeavours have often been made in France to discover a substitute for foreign coffee. According to M. Pajot Descharmes, the seeds of the broom answer this purpose exceedingly well, relying on the opinion of a person who has taken it for twelve years. Being moderately roasted, ground, and prepared in the manner of ordinary coffee, the person finds no difference between it and coffee. It is not the garden but the forest broom, the seeds of which are to be taken for this use. It appears that in that part of Holland bordering upon Germany, this substance has been used instead of coffee for many years.

The Seeds of Grapes have been discovered to be an excellent substitute for coffee. When pressed, they first produce a quantity of oil, and afterwards, when boiled, furnish liquid very similar to that produced from coffee. The practice has become very general throughout Germany.

Corns.—Dr. Brown, one of the physicians of the New York Hospital, in a practical dissertation on the use of lunar caustic, has given the following directions for removing corns, which he says he has found more successful than any plan that has been recommended:—After bathing the foot in warm water (at bed time) till the corn becomes considerably softened, shave the substance down with a knife or scalpel, but not so close as to occasion bleeding; then moisten the surface with saliva, and rub over it the lunar caustic. The application of this article should be extended a little beyond the edges of the corn, and continued till such a quantity adheres as, in a short time, will change it to a dark gray, and eventually, completely black. There is no hazard in applying too much, especially on the corn itself. A little raw cotton or lint should be then applied over the part, so as to prevent its coming in contact with the stocking. In about four or six days the part acted upon by the caustic will peel off, including every vestige of corn, leaving the part quite smooth, and of a natural appearance.—*Gaz. Health.*

A Cream Gauge is a very useful appendage to a dairy. This is a glass tube, exactly cylindrical, of about 1 inch in diameter, and 10½ inches long. On its outside is a graduated scale, 3 inches long, and each inch is divided into ten equal parts. The scale commences at exactly the height of 10 inches from the bottom of the tube; it is numbered, and counts downwards. Being filled up to 10 inches high with new milk, of a proper temperature, it is set by in the dairy for 12 hours, in which time the cream will all of it have risen to the top of the tube, if the cow be a proper one from which to make butter.—*Waistell on Agr. Build.*

To Improve dried Figs.—These fruits, when they are brought to table, are commonly covered with a scurf, composed of a mealy, sugary substance, very disagreeable to the teeth. A correspondent says that the way to get rid of this scurf, and render the figs as plump and clear-skinned as when they are newly gathered from the tree, is, first to keep them in a cool and rather moist cellar, for twenty-four hours before using; and, secondly, just before presenting them at table, to put them into a receiver, and exhaust the air. After remaining there two minutes, they should be taken out, and gently brushed, when they will be found perfectly plump and clear-skinned. —*Gard. Mag.*

Damp may be prevented from exuding from the walls of Apartments, by first drying them thoroughly, and then saturating them with fatty matter of any kind. One part linseed oil, boiled with one-tenth of its weight of litharge, and two parts of resin, if applied in successive coats, will, after the fifth time, form a varnish on the wall, so hard and compact, as to be impermeable by moisture.

Loss of weight in Meat during Cooking.—4 lb. of beef lost by boiling 1 lb.; 4 lb. ditto lost by roasting 1 lb. 5 oz.; 4 lb. ditto lost by baking 1 lb. 3 oz.; 4 lb. mutton lost by boiling 14 oz.; 4 lb. ditto lost by roasting 1 lb. 6 oz.; 4 lb. ditto lost by baking 1 lb. 4 oz.

To preserve Potatoes in a proper state for food for many years, it is only necessary to scald them, or subject them to a heated oven, for a few minutes. By doing this they will never sprout, and the farinaceous substance will keep good for many years, provided the cortical part be entire. They should be well dried after being scalded.—*Worcester Herald.*

Tobacco.—Dr. Chapman has found the inhalation of the vapour of tobacco to succeed in several cases of spasms about the upper part of the windpipe, approaching nearly to spasmodic croup or spasmodic asthma. He recommends the vapour to be produced by smoking a cigar, during which the patient should frequently attempt to make a deep inspiration, so that the internal surface of the air vessels may be exposed to the action of the vapour.—*Gaz. Health.*

Kneading Machine.—M. Hazzi has introduced in Munich, among the bakers, the use of a kneading machine; it is also used by a number of bakers in Paris, and, we hope, for the reputation of England in respect to cleanliness, it will soon become general here. It is very simple and cheap, and requires no art in the use.—*Gard: Mag.*

Cider.—Mr. Platt had a curious mode of making strong cider in America. In the month of January or February, he placed a number of hogsheads of cider upon stands out of doors. The frost turned to ice the upper part of the contents of the hogshead, and a tap drew off from the bottom the part which was not frozen. This was the spirituous part, and was as strong as the very strongest of beer that can be made. The frost had no power over this part; but the lighter part which was at the top it froze into ice. This, when thawed, was weak cider. This method of getting strong cider would not do in a country like this, where the frosts are never sufficiently severe.—*Cobbett's Gardener.*

Keeping Apples.—When there is frost, all that you have to do, is to keep the apples in a state of total darkness until some days after a complete thaw has come. In America they are frequently frozen as hard as stones; if they thaw in the light, they rot; but if they thaw in darkness, they not only do not rot, but lose very little of their original flavour. This may be new to the English reader; but he may depend upon it that the statement is correct.—*Ibid.*

To Keep Chestnuts.—To preserve chestnuts, so as to have them to sow in the spring, or to eat through the winter, you must make them perfectly dry after they come out of their green husk; then put them into a box or barrel mixed with, or covered over by, fine and dry sand, three gallons of sand to one gallon of chestnuts. If there be maggots in any of the chestnuts, they will come out of the chestnuts and work up through the sand to get to the air; and thus you have your chestnuts sweet and sound and fresh. —*Ibid.*

Bulbous Roots.—In glasses filled with water, bulbous roots, such as the hyacinth, narcissus, and jonquil, are blown. The time to put them in is from September to November, and the earliest ones will begin blowing about Christmas. The glasses should be blue, as that colour best suits the roots; put water enough in to cover the bulb one-third of the way up, less rather than more; let the water be soft, change it once a week, and put in a pinch of salt every time you change it. Keep the glasses in a place moderately warm, and near to the light. A parlour window is a very common place for them, but is often too warm, and brings on the plants too early, and causes them to be weakly.—*Ibid.*

FINE ARTS.

Some Account of the Colosseum, in the Regent's Park. By the courtesy of Mr. Hornor, the proprietor, we have been favoured with a private view of the *interior* of this stupendous building. The interior is, however, in an unfinished state; the works are in actual progress, and the operations of the several artists continue uninterrupted by the access of visiters.

On entering the edifice by the large door in front, a staircase on the right leads to a passage, which communicates with a circular saloon hung with coloured drapery. This room, which, when finished, will be the largest of the kind in London, occupies the whole internal space, or the basement of the building, with the exception of the staircase leading to the summit, which rises like a large column from the centre. This circular saloon is intended for the exhibition of paintings and other productions of the fine arts.

The wall of the building represents a panoramic *View of London*, as seen from the several galleries of St. Paul's Cathedral; and the view of the picture is obtained from three galleries; the *first* of which corresponds, in relation to the view, which the first gallery at the summit of the dome of St. Paul's; the *second* is like that of the upper gallery on the same edifice; and the *third*, from its great elevation, commands a view of the remote distance which describes the horizon in the painting. Above the last-mentioned gallery is placed the identical copper ball which for so many years occupied the summit of St. Paul's; and above it is a fac-simile of the cross by which it was surmounted. Over these is hung the small wooden cabin in which Mr. Hornor made his drawings for the picture, in the same perilous situation it occupied during the period of the repairs which some years ago were done to the cathedral. A small flight of stairs leads from this spot to the open gallery which surrounds the top of the Colosseum, commanding a view of the Regent's Park and the subjacent country.

The communication with the galleries is by staircases of curious construction, built on the outer side of the central column already mentioned This column is hollow, and within it a small circular chamber is to be caused to ascend when freighted with company by means of machinery, with an imperceptible motion to the first gallery. The doors of the chamber will then open, and by this novel means of being elevated, visiters may avoid the fatigue of ascending by the stairs, and then walk out into the gallery to enjoy the picture.

In extent and accuracy, the Panorama is one of the most surprising achievements of art in this or any other country. The picture covers upwards of 40,000 square feet, or nearly an acre of canvass; the dome of the building on which the sky is painted, is thirty feet more in diameter than the cupola of St. Paul's; and the circumference of the horizon from the point of view, is nearly 130 miles.

The grand and distinguishing merit of the Panorama at the Colosseum is of a high order. It has the *unusual* interest of picturesque effect with the most scrupulous accuracy; and, in illustration of the latter excellence, so plain are the principal streets in the view, that thousands of visiters will be able to identify their own dwellings. In order to court the rigorous inspection of the most critical visiters, engraved sections of the various parts of the picture, numbered and described, will be placed in the compartments to which the panorama corresponds; and for still further gratification, glasses will be placed in the gallery, by which houses at the distance of ten or twelve miles from the city may be easily discerned.

A critical writer in the *Weekly Review*, says, "The spectator who shall view this magnificent Panorama, without being previously informed of the difficulties with which the able and indefatigable artist, Mr. E. T. Parris, had to contend, however he may be struck with the *tout ensemble*, will hardly be able to appreciate the merit of the work. In the first place, as no one individual could accomplish such an undertaking in a sufficiently short period, many artists were necessarily employed; each of these had his own peculiar style, and taste, and notions, which of course he would not depart from; when each of the assistant artists, therefore, had finished his part, it was necessary for Mr. Parris to go himself over the whole, retouch everything, and reduce the various parts into harmony with each other. This he has effected in the most admirable manner." We next entered by the left-hand lodge-door; a range of arched conservatories. Already here are several rare and beautiful plants; a large proportion of exotics, and some of the most curious plants of this country's growth. In the centre of one of the chambers is a circular tank of water, surrounded by small jets, which are to raise their streams so as to form a round case of water, within which are to be aquatic plants, &c. At the end of this room aviaries are in preparation.

Hence we ascended into a beautiful reading-room, with French windows and rusticated Gothic verandas. The *artistes* were here busy in hanging the walls, &c. with green damask moreen. The next room in the suite will be a library of beautiful proportions; and beyond this will be another room equally splendid, besides numerous other smaller apartments, in all numbering thirty. The object of this part of the building is to afford to subscribers all the advantages of a club and a reading-room, combined with the novel and luxurious conveniences of the establishment.

A passage leads from the saloon to a suite of small chambers, representing a Swiss cottage. One of these rooms is finished. It is wainscotted with coloured (knotted) wood, and carved in imitation of the fanciful interior of the dwellings of the Swiss mountaineers. The immense projecting chimney, its capacious corners, and the stupendous fire-dogs, are truly characteristic charms of cottage life; and the illusion is not a little enhanced by the prospect from the windows, consisting of terrific rocks and caverns, among which a cascade is to fall from an immense height into a lake, which is to spread immediately beneath the windows. The water is not yet admitted here; but from some successful specimens of this branch of art, which we have seen, we are induced to think the Swiss cottage and its scenery will be very attractive. The exterior of the dwelling, with its broad eaves, &c. is beautifully picturesque; and the interior is supplied with a suite of rustic furniture.

This is but an imperfect outline of the ingenious works which are now just finishing at the Colosseum. The undertaking, as the name imports, is one of the most gigantic enterprises for public gratification which it has ever been our lot to witness; but great as may be the capital already expended here, and indefatigable as have been the exertions of the proprietor during the last seven years, it is almost impossible that such genius should not be amply remunetrated. The extent occupied by the requisite buildings, &c. is, as we were informed, little short of five acres.—*Abridged from No.* 352 *of the Mirror.*

Lithography.—The manner of outlining the drawings upon stone is as follows:—Tracing facilitates and abridges the work; and it is indispensable when it is desired to produce a fac-simile, or to obtain with the least possible trouble a copy of a drawing, the impressions of which are wanted to stand in the same direction of the original. In this case a transparent paper is taken, such as is known in commeree as *papier vegetal*, or any other kind that is free from those fatty resinous substances which may dirty the stone by taking the printing ink. This paper is laid on the model, and the outline and other principal lines of the design are traced with a lead pencil, or what is still better, with red chalk, which leaves more visible traces on the stone. The outline thus obtained is placed on the stone, which has been previously rubbed with a little spirits of turpentine, or slightly moistened with water; it is then covered with a sheet of paper, and subjected two or three times to the action of the press. The lines made on the paper will by this means be produced on the stone, and serve to guide the artist in his design. It is not necessary to endeavour to efface any of the marks of the crayon which may appear after the drawing is finished, as they will not injure the impressions in the least. When it is of no consequence obtaining the impressions in the same direction with the original drawings, and there is no press at hand, the outline may be obtained on the stone by rubbing it on the reverse side with chalk, or with plumbago pounded and sifted. It is then fixed on the stone with wafers, and the lines which are to be transferred to it are passed over again with a blunt point. If it is wished to avoid colouring the reverse side of the outline, a sheet of tissue paper is interposed between it and the stone, which paper has been coloured with red chalk on the side which is to be placed next the stone. By so doing and then tracing the outline with a point, it is made to appear on the stone. This mode may be employed for facsimiles, and for all kinds of drawing, it being only necessary to retrace the lines already made either with ink or crayon, as is done with a point or a graver, in working upon copper.—*Gill's Repos.*

Engraving on Steel.—We particularly recommend the *nitrate of tin* to the attention of the engravers upon steel in this country; it may prove a valuable addition to the other menstrua recommended for this operation.—*Ibid.*

Lithochromy, or the Art of multiplying Oil Coloured Lithographic Paintings—M. Malapeau has attempted to obtain oil pictures by means of the mechanical process used in lithography. After painting on the stone the general designs, no fewer than twenty-seven rollers are then in succession passed over the stone in order to communicate to it all the colours which enter into the picture. An impression is then taken in the usual manner, and of course this impression will be a picture coloured with the twenty-seven tints which have been employed. This art is most perfect when the painting is on a large scale. M. Malapeau has executed a Christ larger than life, the effect of which is said to be surprising.—*Revue Encyclopedique.*

Painting, Engraving, and Sculpture.

Mr. Haydon has painted two pictures during the past year,—the *Mock Election in the King's Bench*, and the *Chairing of the Members*,—both of which have been exhibited to the public, and one sold for 500 guineas.

A splendid collection of *Pictures of the Battles of the French Armies* is now exhibiting at the Egyptian Hall, Piccadilly. They are painted by General Le Jeune, who was personally engaged in all the scenes. The outlines of the scenery were sketched during the campaigns, and in the several pictures are portraits of nearly 200 staff and general officers, who have since sat to the painter. Among them are the battles of Somo Sierra, Mount Tabor, Marengo, Moskowa, Barossa, Austerlitz, the Pyramids, and Aboukir.

Two new views have been exhibited at the *Diorama*, in the Regent's Park,—the Cloisters of St. Wandrille, and the Village of Unterseen. A Diorama has likewise been exhibited at a new Bazaar, in Oxford-street; and several dioramic and cosmoramic pictures at the Bazaar, in Baker-street, Portman-square.

The exhibition of the *Society of British Artists* has been unusually attractive, and the purchases of pictures very numerous and advantageous to the exhibitors.

Mr. Lough has produced a group and figure of extraordinary beauty,—*Somnus and Iris;* and *Musidora*, from the episode in Thomson's "Seasons."

A large picture, representing the *Death of Virginia*, has been painted by M. Le Thiere, who, about twelve years since, painted the Judgment of Brutus. It is a spirited production, although liable to some artistical objections.

Mr. Martin has completed and exhibited his grand picture of the *Fall of Nineveh*, which may be considered one of the proudest triumphs of the year, and altogether a work of first-rate genius.

Mulready's picture of the *Wolf and Lamb* has been purchased for 1,000 guineas, and since engraved.

Mr. Lane, a young artist of great promise, (who has been for some years past studying at Rome,) has finished and exhibited an extraordinary painting,—*the Vision of Joseph*,—in which his successful study of the ancient masters may easily be traced. This picture is "unapproachable by any similar attempt in British art." It has, we believe, been purchased by the British Institution.

The above are but a few of the splendid productions of fine art, which have been exhibited during the last year; but they may serve to denote its progress. In *Engraving*, the advance has been still greater. Mr. Finden has completed his portrait of the King, from Sir Thomas Lawrence's picture; and this branch of art is daily rising in public estimation.

PUBLIC IMPROVEMENTS.

St. Katherine's Docks.—On Saturday, the 25th of October, the St. Katherine's Docks were opened.—The site of these docks is immediately below the Tower of London, and is bounded on the north by East Smithfield, on the west and south by Tower-hill and Foss-side-road, and on the east they are separated from the London Docks by Nightingale-lane. The amount of capital raised by shares was 1,352,800*l*., of which 1,200,000*l*., including an outlay for part of the materials for the east dock—not yet completed—has been expended; 500,000*l*. will still be necessary to bring the works to perfection; and this sum will be borrowed on the security of the rates to be received by the company, for the liquidation of which debt a sinking fund will be formed. Independent of the space actually occupied by the docks and warehouses, the company possess freehold waterside property of the value of 100,000*l*., which they were obliged to purchase by the terms of the Act of Parliament, and which yields a large annual rental capable of very considerable improvement. In clearing the ground for this magnificent undertaking, 1,250 houses and tenements were purchased and pulled down—no less than 11,300 inhabitants having to seek accommodation elsewhere. The area thus obtained is about 24 acres, of which 11½ acres are devoted to wet docks. The first stone was laid on the 3rd of May, 1827, and upwards of 2,500 men have since been employed, from day to day. The lock leading from the river is 195 feet long, and 45 feet broad; and is crossed by a swing-bridge 23 feet wide, supposed to be the largest of the kind yet executed. This constitutes the main thoroughfare along the side of the river, from Burr-street, at the back of the warehouses, towards Iron-Gate. It was designed by Mr. Telford, and the bridge furnished by Mr. Seward. The great advantage of the lock is, that it is sunk so deep that ships of 700 tons burden may enter at any time of the tide—a desideratum long wished, and, for the first time, accomplished by the St. Katherine's Dock Company. There are three gates in the lock,—the first next the river, one in the centre, and the third leading to the basin, the machinery of which was manufactured by Mr. Bramah. On the right of the lock, and immediately within the dock walls, the engine-house is situated. It is furnished with a steam-engine of 200-horse power, by means of which the lock may be filled or emptied as occasion may require. A lock of 14 feet depth can be made with the assistance of the gate-paddles in 6 minutes. The warehouses are upon the most extensive scale. They are five stories high above the ground in the fronts facing the docks, and six in those facing the streets; the former half of the ground-floor being eighteen feet high, open, and supported by massive pillars, for the accommodation of vessels discharging; and the latter being divided into two stories by means of a mezzanine, and devoted to the warehousing of goods. The Smithfield range is 400 feet by 105 feet; the Foss-side-road ditto, 475 feet by 95 feet; the Tower-hill ditto, 440 feet by 125 feet; and there are commodious vaults under the whole.

There is a liberal supply of powerful cranes below; and, over the wells or shafts, which reach from top to bottom of the building, is machinery for raising goods to the height required. Each crane has an umbrella-shaped covering to protect the apparatus from the weather, and a bell by which to announce to those above when the tackle is made secure. The columns supporting the walls of the warehouses next the dock are 3 feet 9 inches in diameter, with Doric capitals. They are of cast-iron, 2 inches thick. The pillars supporting the floors are also of cast-iron, three inches in diameter, and so furnished with flaunches, as to give their section the appearance of a St. George's cross. The stairs are wholly of granite, and the pavement of the quays, in the neighbourhood of the cranes, of cast-iron. Sliding mooring-rings are fixed in the dock walls, which rise and fall with the fluctuation of the water, so that there is no occasion for loosening or tightening the headfasts of the vessels.

In the dock-house, which is entered from Tower-hill, nearly opposite to the Mint, extensive and convenient offices are constructed; the officers of the Customs and Excise are accommodated within the building. It is a neat elevation, ornamented with three-quarter Doric columns above, and rustic work on the ground-floor. The long room for the general dispatch or business is 100 feet by 50; and the board-room and accountant's and superintendent's rooms are of commodious dimensions, communicating, by means of a railed gallery and stone steps, with the wharfs below.

The docks will be capable of containing from 150 to 160 ships at one time, independent of craft. The depth of water at spring-tides is 28 feet in the lock, being 4 feet more than is to be found in any other dock in London; and in consequence of a channel being kept clear in the river of 300 feet wide, a ship, however large, may come up to St. Katherine's Dock at any time in perfect safety, with the certainty of admission.

The engineer of these works is Mr. Telford—the architect, Mr. Hardwicke.—*Comp. Almanac.*

The repairs and improvements of the domestic apartments of *Windsor Castle*, (see page 214 of our last volume,) have been completed; and his Majesty took possession of them on the 8th of December.

Buckingham Palace has undergone great alterations, by raising the wings, which alterations are estimated at 50,000*l.*; and the whole palace 432,926*l.*

The Liverpool and Manchester Railway is one of the most important undertakings of the past year, and is entitled to special description. The progress of the works, commencing with the tunnel under the town of Liverpool, and proceeding along the line towards Manchester, is thus described by the engineer:—

The first shaft was commenced in October, 1826, but the excavating of the tunnel did not take place till January, 1827, and was completed in the early part of September, 1828. It measures 16 feet high, 22 feet wide, and 2,200 yards long. The total quantity of cubic yards excavated, including the extra quantity where artificial arching is required, amounts to 80,000 yards. The permanent road in the tunnel is commenced, and will in a few months be completed. At the lower end of the tunnel, where the warehouses are to be situated, the excavation is 20 feet deep. The total quantity to be excavated is 40,000 cubic yards, of which 5,000 are removed. At the higher entrance into the tunnel, the cutting is 50 feet deep. The contents of this excavation is 150,000 cubic yards; 112,000 have been removed.

Olive Mount excavation.—This is the most extensive excavation of rock in the whole line; it is upwards of two miles in length; the greatest depth is 70 feet, which is at that place entirely rock, of the same character as that in the tunnel. This work contains 480,000 cubic yards; 301,782 are removed.

Broad Green embankment.—This is nearly three miles long, and for a distance of 400 yards will average 45 feet in height; it is made up by the material from the excavation last mentioned, and that of Huyton and Rainhill at the other end. The content is 550,000 cubic yards, 330,000 of which are completed.

Huyton excavation.—This work is now finished; it has produced 47,000 cubic yards, the greater part of which has been employed in forming the last-mentioned embankment.

Rainhill excavation.—The material from this has hitherto been removed to form embankments in its vicinity. We expect a sufficient quantity of stone will be furnished by this cutting for the masonry at and near it. The total content is 220,000 cubic yards; 141,260 have been removed.

Sutton excavation is situated two miles from Rainhill: its content is 144,000 cubic yards; 66,800 yet remain. The material from this situation is employed to fill up the lower parts of the line, towards the Sankey canal, a distance of three miles, passing over Parr Moss nearly on a level. This moss varies from 6 to 20 feet in depth, and extends in the direction of the line of railway three-quarters of a mile. The plan adopted in crossing the Sankey Valley is partly by a viaduct supported on arches, and partly by embankments. The viaduct is supported on 9 arches, each 50 feet span, and varying from 60 to 70 feet in height. The wingwalls, piers, and abutments are supported on piles, driven from 20 to 30 feet deep below the surface. The embankment which joins the viaduct attains the height of 60 feet, and will yet require 60,000 cubic yards,—140,000 are already embanked. There being no contiguous excavation of sufficient magnitude for forming this work, we have purchased land for supplying the deficiency.

Newton Bridge.—Near Newton the railway passes over the main post-road between Warrington and Bolton, and also a small river, at an elevation of 40 feet above the water. This bridge has four arches of 30 feet span each.

Kenyon excavation.—This work exceeds in magnitude any other on the line. It contains 700,000 cubic yards—nearly one-half is completed.

Chat Moss extends four miles on the line of road; on each side of the Moss the land lies low; on the western side an embankment is formed of moss nearly a mile in length, and varying from 10 to 20 feet in height, which stands extremely well; the slopes of this embankment are a little more upright than the angle of 45, which, from our experience, stands better than if more inclined. It is now covered with a material from two to three feet thick, consisting of sand and gravel. The permanent road is laid upon this covering, and remains very firm; the quantity of excavations made in the moss to form the embankments adjoining amount to 520,000 cubic yards. That portion of the Moss, about three-quarters of a mile from the western edge, called the "Flow Moss," from its extreme softness, is also covered with sand and gravel; underneath I have laid hurdles thickly interwoven with twisted heath, which forms a platform for the covering. Two years ago a person was not able to pass over this portion of the Moss, except in the dryest weather; at present we have horses travelling with loads of from six to twelve tons.

Eccles excavation.—This work extends from Eccles to Manchester. 145,000 cubic yards are excavated, 150,000 remain to be removed; nearly the whole of the earth from this excavation is required to complete the embankment adjoining Chat Moss.

Manchester Bridge.—This bridge is not yet commenced; it will consist of two arches, each 58 feet span. The road-way will be raised 40 feet above the water of the Irwell over which it passes.

Twenty-five bridges are already erected on the line; and 36 culverts, of large dimensions, formed, with several others of a smaller size. The stone for the bridges and walls on the respective lines has, in most instances, been obtained from the excavations.—*Comp. Almanac.*

London Bridge.—All the arches are now turned, and the bridge is rapidly advancing to its completion. The plan for the approaches is not yet decided by the Committee; but several models have been submitted for their inspection.

Kingston New Bridge.—A new bridge has lately been constructed over the Thames, from Kingston-upon-Thames to Hampton-Wick, in the royal manor of Hampton Court. It is built of Portland stone, and consists of five elliptical arches, the centre arch being 60 feet span by 19 in height, and the side arches 56 and 52 feet span respectively. The abutments are terminated by towers or bastions, and the whole is surmounted by a cornice and balustrade, with galleries projecting over the pier; which give a bold relief to the general elevation. The length of the bridge is 382 feet by 27 feet in width. It is of chaste Grecian architecture, from the design of Mr. Lapidge. The building contract was undertaken by Mr. Herbert for £26,800. and the extra work has not exceeded £100. a very rare, if not an unprecedented occurrence in either public or private undertaking of this description. The first stone was laid by the Earl of Liverpool, November 7, 1825, and the bridge was opened in due form by her royal highness the Duchess of Clarence, on July 17, 1828.

The old bridge was of wood, and 168 yards in length. It was the most ancient on the River Thames, except that of London, and is mentioned in a record of the 8th year of Henry III.

London University.—(see Frontispiece.) This elegant building is now rapidly proceeding, and the engraving represents the whole structure, as it will appear when completed. A synopsis of the original plan will be found at page 217, of the *Arcana of Science* for 1828, and in its progress scarcely any deviation has been made.

Notwithstanding the unfinished state of the building, the council having reported it to be complete in all essential particulars, for the commencement of the intended system of education. The establishment was opened on the 1st of October, (the day originally fixed,) being within 17 months from the day on which the first stone of the University was laid. During the month of October, upwards of 200 students were registered.

As far as we can judge, the exterior will at once be elegant and imposing, and possessing a very appropriate simplicity, capable of producing a grand effect, not only from the omission of all petty ornaments, but from the largeness of its parts. The portico of ten columns will probably be unequalled in magnificence by any building of the country.

King's College.—Within the year, the erection of another college to be entitled "King's College," has been resolved on, and subscriptions to the amount of 130,000 pounds have already been raised. The site of the College is, we believe, not yet decided. The ring in the Regent's Park is within the occupation of the Committee, but it has been proposed to finish Somerset House, by adding the eastern wing, and appropriating a portion of this noble pile to the great national object which has hitherto proceeded so auspiciously. The details respecting the plan for conducting the College have been prepared by the Provisional Committee, and will be found at length in No. 624 of of the *Literary Gazette.*

The Parks.—The enclosed portion of St. James's Park, which has been tastefully disposed and planted, is now open to the public. The grand Lodge Entrance to the King's Palace is also completed; and elegant gates adjoining, have been opened into the Green Park. A new bridge crossing the Serpentine River, in Kensington Gardens, has likewise been finished, and is the most elegant structure of its kind that we have seen for a long time.

SCIENTIFIC EXPEDITIONS.*

THE contributions to this department have been very copious during the past year, although our limits will allow us little more than an enumeration of some of the principal enterprises.

Geographical Society of Paris.—During the year, twenty-two travellers have been pursuing their inquiries, under the auspices of this society, in Peru, Colombia, Chili, Persia, India, Thibet, Arabia, Georgia, Numidia, Abyssinia, Senegal, &c. besides the Antilles, and a Voyage round the World.

Fernando Po.—Very satisfactory accounts have been received from this new settlement. They are too numerous and extensive for detail or abridgment; but the curious reader will be gratified with several communications from the Colony, which have appeared from time to time in the *Literary Gazette* and *Athænæum*, during the year.

South Pole.—Capt. Foster, who accompanied Capt. Parry in his last voyage, has sailed on a scientific voyage towards the South Pole. Pendulum experiments and magnetic phenomena are the objects of this voyage, which, it is expected, will tend to the advancement of our geographical knowledge, and the improvement of navigation. Capt. Foster's absence from this country is limited to three years.

Northern Expedition.—Professor Hanstein has set out on his journey to Siberia. His grand object is to observe the phenomena of magnetism, and to ascertain, if possible, the situation of the magnetic poles, &c.; in which, it is calculated, he will be occupied two years.

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* A small work is announced for almost immediate publication, entitled "*The Cabinet of Voyages and Travels for* 1829," which will comprehend Synoptical Accounts of all the SCIENTIFIC EXPEDITIONS of the past year. This work will be in a popular style, and the Narratives of several *Recent Voyages and Overland Journeys*, will contain every new fact that has been added to nautical and geographical science, with the most interesting details of the Natural History of the respective countries and the Manners and Customs of their Natives,—the greater part of which will, it is presumed, be new to the general reader. The whole will be comprised in a neat pocket volume, at a price adapted to all classes of purchasers.

African Geography.—Capt. Botoler, who served with much distinction under Capt. Owen, in his extensive survey of Africa, chiefly on the eastern coast and Madagascar, has been appointed by our government to complete the survey of the western coast from the Straits of Gibraltar to the Cape de Verd Islands.

Capt. Beechey's Expedition.—The Blossom, Capt. Beechey, has returned to England, after an absence of upwards of three years, on a voyage of science and discovery. The main object of this voyage was the conveyance of supplies to Icy Cape, for the Land Arctic Expedition under Capt. Franklin, in the event of that enterprising traveller having succeeded in reaching the extreme north-western point of America. This not being accomplished by him, Capt Beechey was directed by the Admiralty to make such researches and surveys in the Pacific as might be most advantageous to maritime and geographical knowledge generally. Capt. B. has been accompanied by an experienced naturalist; and extensive collections have been made and preserved during his admirably conducted voyage.

Timbuctoo.—M. Caillé has completed a journey of 15,000 leagues, a thousand of which were through countries almost unknown. It may already be concluded from it, that Timbuctoo is more to the south, and nearer to the sea, than it is set down in all the maps. M. Caillé's labours confirm the conjecture which was entertained beforehand, that this great town is not far from the fourth degree of longitude, east of Paris, and the sixteenth degree of north latitude. He has returned, and will probably proceed on another journey.

River of the Amazons.—Among the most remarkable exploits of English travellers is that of Lieut. Maw, R. N. having crossed the Cordillera from Peru, embarked near Moyobamba on one of the smaller streams which fall into the Guallaga, and thus come down the Amazons, being the first Englishman who has ever descended that river.

New Zealand.—An English sailor has lately returned from New Zealand, after having been detained there 10 years. He has written a journal detailing much curious information respecting the manners of the natives, which will shortly be published.

Egypt.—Several letters have been received from M. Champollion and his companions in the scientific expedition to Egypt, which detail many interesting antiquarian discoveries, and observations on the country. Champollion's last letter is dated October 18, from Gizeh, whence he set out for Upper Egypt, his "real head quarters." He has applied to the French government for pecuniary means, and to the honour of France, his application is likely to be complied with, as the *Academie des Sciences* and the King take a warm interest in the success of the expedition.*

Copper Mine River.—The Russian possessions on the N.W. coast of America offer great facilities for an Overland Journey from Copper River to the Frozen Ocean and Hudson's Bay. The Copper River, of which nothing is at present known but the mouth, might be the starting place for an expedition by land, the object of which, independently of important geographical discoveries, would be the acquisition of new countries, abounding in copper and valuable furs, and probably in rich silver mines.—*Russian Journal.*

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* M. Champollion, jun. on his way to Egypt, stopped at Aix, where he discovered in the possession of a M. Sallier, several *papyri* of great value. Among them are a contract for sale made under the reign of one of the Ptolemies, a History of the Campaigns of Sesostris Rhameses, besides several rolls treating of astrology, &c

African Discoveries.—We regret to announce the death of four intrepid travellers, who have fallen victims to this pestilential country. *Major Laing, Capt. Clapperton, Major Denham,* and the *son of Mungo Park.*

Major Laing was murdered near Timbuctoo, by the natives breaking into his tent. The death of *Clapperton* has been confirmed by the return of Lander, his faithful servant, who relates that his master died of dysentery, at Sackatoo, at the age of 38. The Narrative of Clapperton's Journey has just been published. *Major Denham,* who had been appointed Governor of Sierra Leone, died there after a very short illness. *Young Park* died October 31, 1827. He went out as a midshipman of the Sybille, with a full determination to proceed on foot, and alone, from the coast to the spot where his father perished. He set out from Accra, and proceeded as far as Yausong, the chief town of Acquimbo, distant from the coast about 140 miles. Here the natives were celebrating the Yam feast, to witness which Park got up into a Fetish tree, which is regarded by the natives with fear and dread. Here he remained a great part of the day, exposed to the sun, and was observed to drink a great quantity of Palm wine. In dropping down from one of the lower branches, he fell on the ground, and said that he felt a severe shock in his head. He was that evening seized with a fever, and died in three days. There was an idle report of Park being poisoned, for which there appears not the slightest foundation.

Fate of La Perouse.—The *Research,* fitted out by the Bengal government, under the command of Capt. Dillon, to explore the vestiges of La Perouse, the unfortunate French circumnavigator, has returned with ample testimonies to the accuracy of the conjectures formed by Capt. Dillon, respecting the probable wreck of La Perouse on the Malicolo, or Mannicola Islands. Several relics were likewise found there which tended to substantiate the fact. Thus, after a period of 40 years, has the fate of La Perouse been ascertained.

MISCELLANIES.

LIST OF PATENTS.

To W. Gossage, of Leamington Priors, Warwick., for improvements in the construction of cocks for the passage of fluids.—2nd of Jan. 1828.—6 months allowed to enrol specification.

To T. Botfield, of Hopton Court, Salop, for improvements in making iron, or in the method or methods of smelting and making of iron.—2nd of January.—4 months.

To J. Hall, jun., of Ordsall near Manchester, for improvements in dying piece-goods by machinery.—2nd of January.—2 months.

To J. Cl. Daniell, of Stoke, Wilts, for improvements in dressing cloths. 2nd of January.—6 months.

To W. Morley, of Nottingham, for improvements in and additions to machinery in making lace or net.—9th of January.—6 months.

To J. A. Hunt Grubbe, of Stanton Saint Bernard, Wilts, clerk, for a transmitting heat wall for the ripening of fruit.—9th of Jan.—6 months.

To J. Gilbertson, of Hertford, for an improvement in the construction of furnaces, by which they consume their own smoke.—15th Jan.—2 mo.

To C. Hooper, of Spring Gardens, in the parish of Marston Bigott, Somersetshire, for an improved machine for shearing and cropping woollen and other cloths.—15th of January.—2 months.

To J. Evans the younger, of Moreton Mills, near Wallingford, Berks, for improvements on steam engines.—15th of January.—6 months.

To J. Blades, of Clapham, Surrey, for an improvement in the waterproof stiffening for hats: communicated from abroad.—15th Jan.—6 mo.

To W. Newton, Chancery Lane, for an improved surgical chair-bed with various appendages.—15th of January.—6 months.

To G. D. Harris, of Field-place, near Stroud, Gloucestershire, for improvements in dressing and preparing woollen yarns, and in cleansing, dressing, and finishing woollen cloths, &c.—15th of January.—6 months.

To J. Falconer Atlee, of Prospect-place, Deptford, for improvements on bands or hoops for securing made and other masts, bowsprits and yards.—15th of January.—6 months.

To W. Erskine Cochrane, Esq., of Regent-street, for improvements in certain apparatus for cooling.—15th of January.—6 months.

To J. Taylor Beale, of Church-lane, Whitechapel, and G. Richardson Porter, of Old Broad-street, for their new mode of communicating heat.—19th of January.—6 months.

To G. Jackson, of Saint Andrew, Dublin, for improvements in machinery for propelling boats and other vessels.—19th of January.—6 months.

To W. Percivall, of Knightsbridge, for improvements in the construction and application of shoes without nails to the feet of horses.—19th Jan.—6 months.

To J. Weiss, Strand, for improvements on instruments for bleeding horses, &c.—26th of January.—6 months.

To Augustus Applegath, of Crayford, Kent, for his improvements in block printing.—26th of January.—4 months.

To Donald Currie, Esq., of Regent-street, for a method of preserving grain and other vegetable and animal substances and liquids. Communicated from abroad.—31st of January.—6 months.

To W. Nairn, of Dane-street, Edinburgh, for his improved method of propelling vessels through, or on the water by the aid of steam, or other mechanical force.—5th of February.—6 months.

To C. Hitch, of Ware, Hertfordshire, for his improved wall for building.—21st of February.—2 months.

To G. Dickinson, of Buckland Mill, near Dover, for his improvements in making paper by machinery.—21st of February.—4 months.

To Angelo Benedetto Ventura, of Cirencester-place, Fitzroy-square, for his improvements on the harp, lute, and Spanish guitar.—21st Feb.—6 mo.

To T. Otway, of Walsall, for an expedient for stopping horses when running away.—21st of February.—2 months.

To D. Bentley, of Pendleton, Lancashire, for an improved method of and machinery for bleaching and finishing linen or cotton yarn and goods.—21st of February.—6 months.

To W. Brunton, of Leadenhall-street, for improvements of furnaces for the calcination, sublimation, or evaporation of ores, metals, &c.—21st Feb.—2 months.

To J. Levers, of Nottingham, for improvements in the manufacture of bobbin net-lace.—3rd of March.—4 months.

To W. Pownall, of Manchester, for improvements in making healds for weaving.—6th of March.—4 months.

To B. H. Brook, of Huddersfield, for improvements in the construction and setting of ovens or retorts for carbonizing coal for gas-works.—6th of March.—6 months.

To Lieut. W. Roger, of Norfolk-street, Strand, for improvements on anchors.—13th of March.—6 months.

To R. G. Jones, of Brewer-street, Golden-square, for a method communicated from abroad, of ornamenting china and other compositions, which he denominates Lethophanic, translucid, or opaque china.—13th March.—2 months.

To G. Scholefield, of Leeds, mechanic, for improvements in, or additions to, looms for weaving woollen, linen, &c.—13th of March.—6 months.

To N. Gough, of Salford, Manchester, for an improved method of propelling carriages or vessels by steam.—20th of March.—6 months.

To S. Clegg, of Chapel Walks, Liverpool, for improvements in steam-engines, and steam-boilers and generators.—20th of March.—6 months.

To Jane B. Lowrey, wife of T. S. Lowrey, of Exeter, for her improvements in the manufacture of hats and bonnets.—25th March.—6 months.

To E. Cowper, of Clapham-road Place, Lambeth, for improvements in cutting paper.—26th of March.—6 months.

To F. de Fourville, of Piccadilly, for improvements on filtering apparatus.—26th of March.—6 months.

To T. Laws, Strand, for an improved thread to be used in the manufacture of bobbin net lace.—29th of March.—6 months.

To H. Marriott, of Fleet-street, and Augustus Siebe, of Princes-street, Leicester-square, for certain improvements in hydraulic machines.—29th of March.—6 months.

To Peter Taylor, of Hollinwood, Lancaster, for certain improvements in machinery for hackling, dressing or combing flax, hemp, &c.—29th March.—6 months.

To John Davis, of Leman-street, Goodman's-fields, for an improvement (communicated from abroad) in boiling or evaporating solutions of sugar and other liquids.—29th of March.—6 months.

To C. Harsleben, Esq., of New Ormond-street, for improvements in machinery to be used in navigation and the propelling of ships.—3rd of Apr.—6 months.

To S. W. Wright, of Webber-street, Lambeth, engineer, for improvements in the construction of wheel carriages.—15th of April.—6 months.

To J. G. Ulrich, of Cornhill, for his improvements on chronometers.—19th of April.—6 months.

To W. Marshall, of Fountain Grove, Huddersfield, for improvements in machinery for cutting or shearing, cropping and finishing cloth, &c.—26th of April.—2 months.

To T. Breidenback, of Birmingham, for a machine or improved mode for forming tubes or rods, &c.—26th of April.—4 months.

To J. Griffen, of Withy Moor Works, near Dudley, for an improvement in the manufacturing of scythe backs, chaff-knife backs, and hay-knife backs.—26th of April.—6 months.

To J. J. Watt, of Stracey-street, Stepney, for his discovery of the application of a certain chemical agent by which animal poison may be destroyed and the disease consequent thereon effectually prevented.—26th of April —6 months.

To C. C. Bompas, Esq., of the Inner Temple, for his improvements in the propelling of locomotive carriages and machines, and boats and other vessels.—29th of April.—6 months.

To T. Hillman, of Mill-wall, Poplar, for improvements in the construction and fastening of masts.—1st of May.—6 months.

To J. Brownill, of Sheffield, for his improved method of transferring vessels from a higher to a lower level, or from a lower to a higher level on canals, and also for the more conveniently raising or lowering of weights, carriages, or goods, on rail-roads, &c.—1st of May.—6 months.

To J. Palmer, of Globe-road, Mile-End, for improvements in the moulds, machinery, or apparatus for making paper.—6th of May.—6 months.

To T. Adams, of Oldbury, Salop, for improvements on trusses, or apparatus for the relief or cure of rupture.—6th of May.—6 months.

To F. Westby, of Leicester, for his apparatus to be used for the purpose of whetting or sharpening the edges of the blades of knives, &c.—6th of May.—2 months.

To Rear Admiral Brooking, of Plymouth, for a turning or shipping fid for securing and releasing the upper masts of ships and vessels.—6th May.—6 months.

To. M. Fulwood, of Stratford, Essex, for a cement, mastic or composition, denominated German Cement.—6th of May.—2 months.

To J. B. Macneil, of Foleshill, Coventry, for improvements in preparing and applying materials for constructing or rendering more durable roads, which materials are applicable to other purposes.—6th May.—6 months.

To T. Jackson, of Red-Lion-street, Holborn, for a new metal stud to be applied to boots, shoes, and other like articles of manufacture.—13th of May.—6 months.

To J. Ford, of Wandsworth-road, Vauxhall, for improvements in machinery for clearing, opening, scribbling, carding, combing, slubbing and spinning wool, and for carding, roving, or shivering and spinning cotton, short-stapled flax, hemp, silk, mohair, &c. either separately or combined.—13th of May.—6 months.

To T. Bensar Crompton, of Tamworth, in Lancashire, and E. Taylor, of Marsden, in Yorkshire, for improvements in the process of paper-making which relates to the cutting.—13th of May.—2 months.

To C. Chubb, of St. Paul's Churchyard, London, for improvements in the construction of door-latches.—17th of May.—6 months.

To T. W. and J. Powell, of Bristol, for improvements in the process of Forming moulds for refining sugar, and in the application of materials hitherto unused in making the said moulds.—17th of May.—2 months.

To T. Aspinwall, Esq., of Bishopsgate Churchyard, London, for an improved method of casting printing types by means of a mechanical process. Communicated from abroad.—22nd of May.—6 months.

To S. Hall, of Basford, Nottinghamshire, for an apparatus for generating steam and various gases to produce motive power, and for other useful purposes.—31st of May.—6 months.

To J. Moffat, of King's Arms-yard, Coleman-street, London, for an improvement in apparatus for stoppering and securing chain cables; also for weighing anchors attached to such chain or other cables, either with or without a messenger.—3rd of June.—6 months.

To D. Jobbing, of Uley, Gloucestershire, for an improved method, by certain machinery applicable to stocks or fulling-machines, of milling and scowering woollen cloths, &c.—3rd June.—2 months.

To Baron Charles Wettersted, of Commercial-place, Commercial-road, for a liquid or composition for water-proofing and strengthening leather.—4th of June.—6 months.

To R. Willy, of Hauley, Staffordshire, for improvements in apparatus for making coal-gas.—10th of June.—6 months.

To E. G. Atherley, of York-place, Portman-square, for an apparatus for a method of generating power.—12th of June.—6 months.

To W. Strachan, of Avon Eitha, Ruabon, Denbighshire, for an improvement in the making of alum.—12th of June.—4 months.

To J. Bartlett, of Chard, Somersetshire, for a new method of preparing flax-thread or yarn for use in the manufacture of boots, shoes, sadlery; and of sail and of other cloths and bagging.—16th June.—2 months.

To G. J. Young, of Newcastle-upon-Tyne, for a machine whereby an additional and improved purchase or power will be given in working ships, windlasses, and capstans.—21st of June.—6 months.

To S. Pratt, of New Bond-street, camp equipage maker, for improvements on elastic beds, cushions, seats, pads, and other articles of that kind. 25th of June.—6 months.

To J. Baring, of Broad-street Buildings, merchant, for a new and improved mode of making machines for cutting fur from skins for the use of hatters. Communicated from abroad.—3rd of July.—6 months.

To J. Johnston Isaac, of Star-street, Edgeware Road, Middlesex, for improvements in propelling vessels, boats, &c.—5th of July.—6 months.

To T. Revis, of Kennington-street, Walworth, Surrey, for an improved method of lifting weights.—10 of July.—6 months.

To J. Hawks, of Weymouth-street, Portland Place, iron manufacturer, for an improvement in the construction of ships' cable and hawser chains. —10th of July.—6 months.

To J. H. A. Gunther, of Camden Town, Middlesex, for improvements on piano-fortes.—10th of July.—2 months.

To Capt. W. Muller, of Doughty-street, Bedford-row, for an instrument or apparatus for teaching mathematical geography, astronomy, and other sciences; and for resolving problems in navigation, spherics, and other sciences.—10th of July.—6 months.

To B. Rider, of Redcross-street, Southwark, for his improvements in the manufacture of hats.—17th of July.—6 months.

To J. Jones, of Amlwch, Anglesea, for his improvement in certain parts of the process of smelting copper ore.—17th of July.—6 months.

To A. Bernhard, of Finsbury-square, for his method of raising water.—24th of July.—6 months.

To R. Wornum, of Wigmore-street, for improvements on upright pianofortes.—24th of July.—2 months.

To J. C. Daniell, of Lumphey Stoke, Wiltshire, for certain improvements applicable to the manufacturing and preparing of woollen cloth.—5th of August.—6 months.

To J. L. Higgins, Esq., of Oxford-street, for his improvents on wheel carriages.—11th of August.—6 months.

To W. Mencke, of Park Place, Peckham, Surrey, for his improvements in preparing materials for, and in the making, bricks.—11th Aug.—6 mo.

To L. R. Fitzmaurice, of Jamaica Place, Commercial Road, Middlesex, for his improvements on ship and other pumps.—11 August.—6 months.

To W. Grisenthwaite, Esq., of Nottingham, for a new process for making sulphate of magnesia, commonly called Epsom Salts.—11 Aug.—6 mo.

To H. Maxwell, of Pall Mall, for an improvement in spring spur-sockets.—13th of August.—2 months.

To T. Stirling, of the Commercial Road, Lambeth, for improvements on filtering apparatus.—16th of August.—6 months.

To B. M. Payne, Strand, scale-maker, for improvements on weighing-machines.—18th of August.—6 months.

To E. Barnard, of Nailsworth, near Minchinhampton, Gloucester for improvements in weaving and preparing cloth.—19th August.—6 months.

To P. Foxwell, W. Clark, and B. Clark, all of Dye House Mill, Minchinhampton, Gloucester, for improvements in machinery for shearing and finishing woollen and other cloths.—19th of August.—6 months.

To W. Sharp, of Manchester, for improvements in machines for spinning or roving of cloth, silk, wool, &c.—19th of August.—6 months.

To G. Stratton, of Frederick-place, Hampstead Road, for an improvement in warming and ventilating buildings.—28th of August.—6 months.

To Granville Sharp Pattison, Esq. of Old Burlington-street, for a method of applying iron in the sheathing of ships, and of applying iron bolts, spikes, nails, and other fastenings in ships and other vessels.—4th of Sept. 6 months.

To J. Seaward and S. Seaward, of the Canal Iron-Works, Poplar, for a new method for propelling carriages on roads, and also ships and other vessels on water.—4th of September.—6 months.

To C. Sanderson, of Park Gate Iron-Works, near Rotherham, Yorkshire, for a new method of making sheer steel.—4th of September.—2 mo.

To Admiral S. Brooking, of Plymouth, for his new mode of making sails of ships and other vessels.—4th September.—6 months.

To J. Robertson, of Limehouse Hole, Poplar, for improvements in the manufacture of hempen rope or cordage.—4th of September.—6 months.

To W. Bell, of Lucas-street, Commercial Road, Middlesex, for his improved methods for filtrating water and other liquids.—4th Sept.—6 mo.

To W. Farish, Jacksonian Professor in the University of Cambridge, for his improved method of clearing out water-courses.—4th Sept.—6 mo.

To T. R. Williams, of Norfolk-street, Strand, for improvements in the making of hats, &c., and in the covering of them with silk and other materials with the assistance of machinery.—11th of September.—6 months.

To T. Minikew, of Berwick-street, for an improvement in the makin of chairs, sofas, beds, and other articles of furniture for similar purposes, and also of travelling and other carriages for personal use.—11th Sept.—2 months.

To J. B. Neilson, of Glasgow, for the improved application of air to produce heat in fire-forges and furnaces where bellows or other blowing apparatus are required.—11th of September.—6 months.

To L. W. Wright, of Mansfield-street, Borough Road, Surrey, for improvements in machinery for making screws.—18th Sept.—6 months.

To W. Losh, Esq. of Benton House, Northamptonshire, for improvements in iron-rails for rail-roads, and of the chains or pedestals in or upon which the rails may be placed or fixed.—18th of September.—2 months.

To J. Rhodes, junior, of Alverthorp, Wakefield, for improvements in machinery for spinning and twisting worsted yarn and other fibrous substances.—18th of September.—6 months.

To J. C. Daniell, of Limpley, in the parish of Bradford, Wiltshire, clothier, for his improvements in the machinery used for dressing woollen cloth.—18th of September.—6 months.

To J. Melville, of Upper Harley-street, for improvements in propelling vessels.—18th of September.—6 months.

To E. F. Orson, of Prince's-square, Finsbury, for an improved cartridge for sporting purposes.—18th of September.—6 months.

To J. Jones, of Leeds, for improvements in machinery for pressing or finishing woollen cloths.—25th of September.—6 months.

To P. Rigby Wason, Esq., of the Middle Temple, barrister at law, for improvement in stick sealing-wax.—25th of September.—6 months.

To J. Neville, of New Walk, Shad Thames, Surrey, for his apparatus for obtaining mechanical power from falls and streams of water—25th of September.—6 months.

To T. Fowler, of Great Torrington, Devon, for improvements in or for raising and circulating hot water, hot oils, and other hot fluids for domestic and other purposes.—2nd of October.—6 months.

To J. Brunton, of West Bromwich, Stafford, engineer, for improvements in the apparatus for manufacturing coal-gas and coke.—2nd of Oct.—6 months.

To D. Napier, of Warren-street, Fitzroy-square, for improvements in machinery applicable to letter-press printing.—2nd of October.—2 months.

To T. Tippett, of Gwennap, Cornwall, for improvements in the construction and working of engines with steam and air, and in the boiler or generator of steam, and in the application of such improved engines to a new method of propelling of vessels and other floating bodies.

To S. Lawson, and M. Walker, of Leeds, for improvements in machinery for preparing and dressing hemp, flax, silk, &c.—9th Oct.—6 mon.

To H. Duxbury, of Pomeroy-street, Kent Road, for a new machine for splitting hides and skins.—9th of October.—6 months.

To E. Hancorne, of Skinner-street, London, for certain improvements in making nails. Communicated from abroad.—16th Oct.—6 months.

To W. Godfrey Kneller, of Great Pearl-street, Spitalfields, chemist, for improvements in evaporating sugar, applicable also to other purposes.—27th of November.—6 months.

To Joseph D'Arcy, Esq., of Leicester-square, for certain improvements in the construction of steam-engines and the apparatus connected therewith.—29th of November.—18 months.

To E. D. Philp, of Regent-street, chemist, for an improved distilling and rectifying apparatus.—29th of November.—6 months.

To R. Stein, of Regent-street, for improvements in distillation.—4th of December.—6 months.

To W. Brunton, of Leadenhall-street, for an instrument to ascertain and register the quantity of specific gravity and temperature of certain fluids in transit, part of which invention is applicable to other purposes.—4th of December.—6 months.

To P. Derbishire, of Ely Place, Holborn, for a certain medicine or embrocation to prevent or alleviate sea-sickness, which may be usefully applied to other maladies.—4th of December.—6 months.

To Z. Riley, of Union-street, Southwark, engineer, for certain improved apparatus to be attached to carriages for safety in travelling.—10th of Dec. —4 months.

To G. Rennoldson, of South Shields, for his improvements in rotatory steam-engines, &c.—4th of December.—6 months.

To J. Hague, of Cable-street, Wellclose-square, engineer, for improvements in the method of expelling the molasses or syrup from sugar.—6th of December.—2 months.

To I. Dickson, of Chester-street, Grosvenor Place, for an improved projectile.—8th of December.—2 months.

To J. Boase, of Albany-street, gentleman, and T. Smith, mechanic, of Augustus-street, both in Regent's Park, for their improvements in machinery for scraping, sweeping, cleaning, and watering streets and roads.—10th of December.—2 months.

To T. Lawes, of the Strand, for his improvement in the manufacture of bobbin-net lace.—10th of December.—6 months.

To C. Cummerow, of Lawrence, Pountney-lane, for certain improvements, communicated from abroad, in propelling vessels.—10th of Dec.—6 months.

To A. Louis, of Dean-street, Birmingham, mechanic, for a mechanical *Volti subito*, to assist the player of music quickly to turn the leaves of music-books whilst playing.—10th of December.—2 months.

THE REVENUE.

Abstract of the Net Produce of the Revenue of Great Britain, in the Years and Quarters ended on the 5th January, 1828, and the 5th January, 1829; showing the Increase or Decrease on each head thereof.

	Years ended Jan. 5th.		Increase.	Decrease.
	1828.	1829.		
	£.	£.	£.	£.
Customs	16,391,838	16,125,118	....	266,720
Excise	16,969,564	18,700,373	1,730,809	....
Stamps......................	6,375,140	6,666,363	291,223	....
Post-Office	1,385,000	1,400,000	15,000	.. ..
Taxes	4,768,273	4,849,302	81,029	....
Miscellanies	764,860	564,166	....	190.694
	46,644,675	48,305,322	2,118,061	457,414
	Deduct Decrease............		457,414	
	Increase on the Year......		1,660,647	

	Quars. ended Jan. 5.		Increase.	Decrease.
	1828.	1829.		
	£.	£.	£.	£.
Customs	4,022,274	3,789,222	....	233,052
Excise	4,228,933	5,023,328	794,395	....
Stamps......................	1,527,585	1,618,630	91,045	....
Post-Office	328,000	341,000	13,000	....
Taxes	2,013,557	2,026,395	12,838	....
Miscellanies	215,730	228,725	7,995	....
	12,336,079	13,022,300	919,273	233,052
	Deduct Decrease		233,052	
	Increase on the Quarter...		686,221	

Income and Charge on the Consolidated Fund, in the Quarters ended 5th January, 1828 and 1829.

INCOME.	Quarters ended Jan. 5.	
	1828.	1829.
	£.	£.
Customs	2,863,390	2,691,105
Excise	4,228,933	5,023,328
Stamps	1,527,585	1,618,630
Post-Office	328,000	341,000
Taxes	2,013,557	2,026,395
Miscellaneous	215,732	223,725
	11,177,197	11,924,183
Tontine Money	11,362	11,399
To Cash brought to this Account from the Ways and Means, to replace the like Sum issued out of the growing produce of the Consolidated Fund, in Ireland, for Public Services	477,264	632,668
	11,665,823	12,568,250

CHARGE	Quarters ended Jan. 5.	
	1828.	1829.
	£.	£.
Exchequer Annuities	1,915	1,994
South Sea Company	97,697	97,694
Bank on their Capital	89,125	89,125
Dividends	8,486,035	8,475,979
National Debt	1,212,100	509,435
Trustee for payment of Naval and Military Pensions	....	....
Civil List	212,500	212,500
Pensions	93,481	94,255
Other Charges	194,083	199,018
	10,386,936	9,680,000
Surplus	1,278,887	2,888,250
	11,665,823	12,568,250
Exchequer Bills issued for the Consolidated Fund, at 10th October, 1828, and paid off out of the Growing Produce of the said Fund in the Quarter ending Jan. 5, 1829	....	4,243,379
Surplus at 5th Jan. 1829	2,888,250	
Issued out of the Consolidated Fund, on account of the Supplies granted for the service of the year 1828	4,012,274	1,124,024
Total at 5th Jan. 1829, to be provided for by an issue of Exchequer Bills charged on the Growing Produce of the Consolidated Fund in the Quarter ending April 5, 1829	....	5,367,403

METEOROLOGICAL ACCOUNT FOR THE PAST YEAR.

Month.	Thermometer.				Barometer.				Rain.	Winds.							
	Highest.	Lowest.	Mean.	Range.	Highest.	Lowest.	Mean.	Range.	In Inches.	N.	S.	E.	W.	N.E.	S.E.	N.W.	S.W.
January ...	56	24	40·06	32	30·33	29·13	29·9172	1·20	3·725		½	1	2	2½	6	½	18½
February ...	55	20	40·16	35	30·37	28·94	29·7547	1·43	1·725	7		1	½	1½	6	2	11
March	63	24	44·41	39	30·30	29·04	29·8500	1·26	·525	6			6	1½	1	8	8
April	73	25	45·85	48	30·29	29·22	29·7638	1·07	2·835	5½	4		2½	2½	1½	1	13
May	72	33	55·51	39	30·29	29·40	29·8164	·89	2·075	4	1½	½	2½	9	3½	1½	8½
June	80	40	61·88	40	30·29	29·29	29·9493	1·	1·850	2½	½	1	3½	4½	3	6	9
July	83	44	62·28	39	29·98	29·24	29·6754	·74	4·25		2		1	1	2	6	19
August	75	41	60·39	34	30·26	29·36	29·8073	·90	3·05	1	½	1	½	2	5	5	16
September	74	36	57·79	38	30·31	29·39	29·8709	·92	2·	4	1	2	1	8½	3	1½	9
October	65	27	48·99	38	30·28	29·35	30·0097	1·03	1·125	1½	2	2	2	3½	3	4	13
November	60	12	42·96	48	30·26	29·22	29·8308	1·04	1·85	1		5	5	2	1	3	13
December...	55	25	44·32	30	30·34	29·22	29·9102	1·12	2·45	1	2	1			4½	3	19½
Year.......	83	12	50·38	61	30·38	28·94	29·8463	1·44	27·46	33½	14½	14½	26½	38½	39½	41½	157½

Explanation of the manner in which the above Journal was kept.

The warmth of the day is observed by means of the thermometer exposed to the north, in the shade standing about four feet above the surface of the ground; the extreme cold of the night is ascertained by a self-registering thermometer, in a similar situation; the daily range of the barometer is known from observations made at intervals of four hours each, from eight in the morning till eight in the evening; the weather and directions of the wind are the result of the most frequent observations; the rain is measured every morning at eight o'clock.

Edmonton. CHARLES H. ADAMS.

CALENDAR OF THE MEETINGS OF THE SCIENTIFIC BODIES OF LONDON FOR 1828-9.

Societies.	Time of Meeting.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.
Royal .... *Somerset-House.*	Thu. 8½ P.M.	20, 27	1*, 11, 18	8, 15, 22, 29	5, 12, 19, 26	5, 12, 19, 26	2, 9, 30	7, 14, 21, 28	4, 18
Antiquaries......... *Somerset-House.*	Thu. 8 P.M.	20, 27	4, 11, 18	8, 15, 22, 29	5, 12, 19, 26	5, 12, 19, 26	2, 9, 23*, 30	7, 14, 21, 28	4, 18
Linnean .... *Soho-Square.*	Tues. 8 P.M.	4, 18	2, 16	20	3, 17	3, 17	7, 21	5, 25*	2, 16
Zoological Club ... *Soho-Square.*	Tues. 8 P.M.	11, 25, 29*	9	13, 27	10, 24	10, 24	14, 28	12, 26	9, 23
Horticultural ...... *Regent-Street.*	Tues. 1 P.M.	4, 18	2, 16	6, 20	3, 17	3, 17	7, 21	1*, 5, 19	2, 16
Medico-Botanical.. *Sackville-Street.*	Tues. 8½ P.M.	11, 25	9	16*, 27	10, 24	10, 24	14	12, 26	9, 23 July 14
Society of Arts .... *Adelphi.*	Wed. 7½ P.M.	5, 12, 19, 26	3, 10, 17	7, 14, 21, 28	4, 11, 18, 25	4, 11, 18, 25	1, 8, 15, 22, 29	1, 13, 20, 27	3, 10
Royal Society of Literature ..... *Parliament-St*	Wed. 3 P.M.	5, 19	3, 17	7, 21	4, 18	4, 18	1, 15, 30*	6, 20	3, 17
Geological........... *Somerset-House.*	Fri. 8½ P.M.	7, 21	5, 19	2, 16	6, 20*	6, 20	3	1, 15	5, 19
Astronomical ...... *Lincoln's-inn-Fds.*	Fri. 8 P.M.	14	12	9	13*	13	10	8	12
Royal Institution .. *Albemarle-St.*	Fri. 8½ P.M.	...	...	23, 30	6, 13, 20, 27	6, 13, 20, 27	3, 10	1, 8, 15, 22, 29	5, 12
Royal Asiatic ...... *Grafton-Street.*	Sat. 2 P.M.	...	6	3, 17	7, 21	7, 14*	4	2, 16	20 July 4, 18

* ANNIVERSARIES.—Royal, Dec. 1, 11 A.M.—Antiquaries, April 23, 2 P.M.—Linnean, May 25, 1 P.M.—Zoological Club, Nov. 29. Horticultural, May 1.—Medico Botanical, Jan. 16.—Royal Society of Literature, April 30.—Geological, Feb. 20, 1 P.M.—Astronomical, Feb. 13, 3 P.M.—Asiatic, March 14, 1 P.M.—Zoological Society, April 20, 1 P.M.

SCIENTIFIC BOOKS, PUBLISHED IN 1828.

ALLMAN's Analysis of the Genera of Plants, 4to.—Auldjo's Narrative of Mont Blanc, royal 4to.—Audobon's Birds of America, parts 1 to 7, folio.

Bacon's Elements of Vocal Science, 8vo.—Baron on Changes of Structure in Man, 4to.—Barrington's Naturalist's Journal, oblong 4to.—Bennet's Fishes of Ceylon, Nos. 1 and 2.—Brand's Tables of Definite Proportions, 8vo.—Brewster's Edinburgh Encyclopædia, vol. 18, part 1, 4to.—Buckler's Account of Eltham, 8vo.—Burgess's Perspective, 8vo.—Bakewell's Introduction to Geology, 3rd edition.

Clarke's Readings in Natural Philosophy.—Cumming's Electro-Dynamics.—Circle of the Seasons, 12mo.—Crisp on the Method of Determining Terrestrial Longitudes.

Darley's Geometrical Companion.—Davy's Architectural Antiquities of Suffolk.—De Langlas on Geographical Projections.—Discourse on the Objects of Science.—Daubeny's Tabular View of Volcanic Phenomena.

Fleming's British Animals.—Flood's Anatomy of the Nervous System.—Formation and Culture of the Tree Rose.—Forsyth's First Lines of Chemistry.—Franklin's Second Expedition.

Gray's Operative Chemist.—Guest on Spinning Machinery.—Guide to Importers and Purchasers of Wine.

Hamilton's Conic Sections.—Harwood on the Southern Coast of England.—Horsfield's Lepidopterous Insects, part 1.—Hutin's Manual of Physiology.

Jevons's Elements of Astronomy.

Kerrigan's Mathematical and Navigation Tables.

Lanzi's History of Painting in Italy, translated by Roscoe.—Lardner's Elements of Euclid.—Loudon's Magazine of Natural History commenced, and continued every alternate month.

Martin's Geological Memoir on Part of Sussex.—Milne's Essay on Comets.—Medical Gazette commenced, and continued weekly.

Parry's Third and Last Voyage of Discovery.—Partington's Manual of Natural and Experimental Philosophy.—Provis's Account of the Menai and Conway Suspension Bridges.—Pearson's Appendix to vol. I of an Introduction to Practical Astronomy.

Rankin's Popular Exhibition of the Effect of Forces applied to Draught.—Ross (Capt.) on Steam Navigation.—Rudiments of Conchology.

Sketch of the Life of Linnæus.—Smith's English Flora.—Soane's Works, Designs of Buildings.—Steuart's Planter's Guide.

Thompson's Zoological Researches and Illustrations.

Walker's Algebraical Notation.—Wallace's Elements of Algebra.—Warren on the Nature and Properties of Animals.—Warren on the Square Root of Negative Quantities.—Watkins' Electro-Magnetism.—Wood's Letters of an Architect from France.

Young's Elements of Geometry.

SCIENTIFIC OBITUARY FOR 1828.

Sir James Edward Smith, President of the Linnæan Society from its establishment in 1788.

Mr. John Atkinson, F.L.S., &c.

Mr. James Sadler, the aeronaut.

Mr. Thomas Bewick, the celebrated wood-engraver.

Major Denham, Capt. Hugh Clapperton, Major Laing, and young Park, the enterprising African travellers.

Mr. William Phillips, one of the most useful geological writers of his time.

Dr. George Pearson, a celebrated physician, and lecturer on chemistry.

Mr. Dugald Stewart, a distinguished writer in the higher departments of mathematics.

M. Thonberg of Upsal, professor of botany.

Dr. Wollaston, one of the most eminent scientific men of his time.

Dr. Gall, the celebrated phrenologist.

Mr. Joseph Collyer, senior associate engraver of the Royal Academy.

The Rev. J. Hellins, B.D., an indefatigable scientific writer.

Mr. Bartholomew Howlet, antiquarian draughtsman and engraver.

Sir William Congreve, Bart., a man of great mechanical genius, the inventer of many important improvements in engineering, and late head of the laboratory department, Woolwich.

Right Hon. Sir William Drummond, a profound scholar and antiquarian.

Dr. Andrew Duncan, Senior, professor of the theory of medicine in the University of Edinburgh.

The Baron Ramond, a distinguished naturalist.

M. Choris, Russian painter of natural history, who accompanied Kotzebue, in his voyage round the world.

M. Jacques-Alexandre Cesar Charles, late librarian to the Institut Royal at Paris.

Mr. Peter Moore, a zealous projector and promoter of many public works.

Mr. George Rennie, the celebrated agriculturist.

Mr. R. P. Bonington, an eminent artist.

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